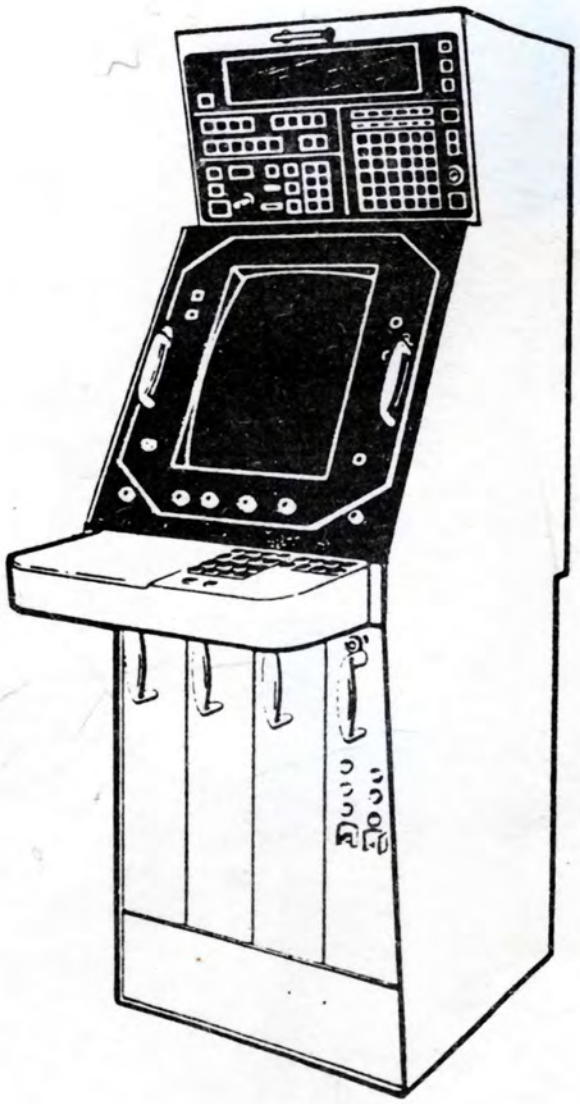
SFCS MK1 MOD1

MAINTENANCE COURSE



TRAINEE GUIDE

PB
1380

RAN Submarine School
HMAS PLATYPUS.

SMWS SFCS

SFCS COURSE HANDBOOK - ISSUE ONE

This handbook has been produced and reflects changes in SFCS. It must be emphasized that this book is to be used as a guide and must not be used as an authorized operating manual or an official RAN publication.

Always refer to the appropriate BR, ABR and WREO's Standing Orders.

Any amendments/corrections and additions should be forwarded to the Course implementation Officer, RAN Submarine School to ensure that the highest level of Systems Engineering knowledge is maintained.

(K.W. GRIERSON)
Lieutenant Commander RAN
Officer-in-charge

Extract from Manual of Safety Security:

'PERSONAL CUSTODY, it is an offence for a person to fail to take reasonable care of any classified documents on information entrusted to him (ABR 337)'

HOW TO USE YOUR GUIDE

TRAINEE GUIDE

This publication is now in your custody and is for your use while learning the operation and maintenance of the RAN Submarine Fire Control (SFCS),MK1 MOD1.

You may place in this study guide any notes that will help you for review later on in this course.

PUBLICATIONS

This publication,RAN Trainees Guide was prepared to guide your training on this equipment and prepare you to use system ABR's in operating and maintaining the RAN SFCS, MK1 MOD1.

Several other pertinent publications will be referred to frequently during the course.

PRESENTATION OF COURSE MATERIAL

The course material on RAN SFCS MK1 MOD1 is divided into Sections and Topics which are presented in a logical sequence.Operation,maintenance, and efficient use of operational aids (ABR's and Job Sheets) are stressed.

The training goals and skills to be acquired are stated for each topic, so that you can check your progress.

Assignments in the ABR's are given for study. The effectiveness of this Trainees Guide depends on the conscientious acomplishment of the assignments and use of the reference publication.

WRITTEN AND PERFORMANCE TESTS

A testing program consisting of written and practical preformance tests to be administered by the instructor is provided.

SAFETY NOTICE

The following are general safety precautions that are not related to any specific procedures and therfore do not appear eleswhere in this publication. These are recommeded precautions that personnel must understand and apply during many phases of operation and maintenance.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must at all times observe all safety regulations. Do not replace components or make adjustments inside the equipment with high voltage supply turned on. Under certain conditions, dangerous potentials may exist when the power control is in the off postion, due to charges retained by capacitors. To aviod casualities, always remove power and discharge and ground capacitors before touching it.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should any person reach into or enter the enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid.

RESUSCITATION

Presonnel working with or near high voltages should be fimiliar with modern methods of resuscitations.

SAFETY PRECAUTIONS

Some voltages present in the RAN SFCS MK1 MOD1 and certain operating procedures may be extremely dangerous. Read the Safety Precautions carefully and be aware when working with the SFCS.

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Assignment Sheet 3-3-1

INTRODUCTION TO THE RAN SFCS MK1 MOD1

A. Objectives

Upon successful completion of these topics you will be able to :

1. Describe the contents and use of the RAN SFCS Technical Manuals.

2. State the purpose of the RAN SFCS.

3. Name and describe the physical characteristics of the individual equipment of the RAN SFCS.

4. Name and describe the applicability of the RAN SFCS Conditions of Readiness.

5. List the RAN SFCS Modes of Operation and describe the related system capablities of each.

6. Describe in general terms, the overall operation of the RAN SFCS.

B. STUDY ASSIGNMENT

1. Read ABR 5297, CHP1, SECT1

2. Read ABR 5297, CHP2, SECT1

3. Read ABR 5297, CHP3, SECT1 (Paragraph INTRODUCTION and SYSTEM OPERATING MODES only).

Ques: Which volume of ABR 5297 contains a description of the Conditions of Readiness?

ANS: _____

_____

_____

ASSIGNMENT SHEET 3-1-1

Ques: What are the full-length names of the following equipment reference designators

Ans: CPU _____

MMU _____

SAU _____

CDC _____

FCC _____

WDC _____

R/R _____

TOAD _____

Ques: Which RAN SFCS Modes of Operation would be used to fire a weapon when experiencing a failure of the CPU?

Ans: _____

_____

_____

Ques: How many operational/tactical functions are available within the RAN SFCS when operating in Normal Mode? List three of them

Ans _____

_____

_____

_____

_____

_____

ASSIGNMENT SHEET 4-6-1

DESCRIPTION OF RAN SFCS MK1 MOD1

A. Objectives

Upon successful completion of these topics, you will be able to:

1. State the purpose of the CD Subsystem.

2. List the major equipment and assemblies that comprise the CD subsystem and describe the physical characteristics of each

3. Describe the functional and operational characteristics and capabilities of the CD subsystem

4. Describe the operation of the CD subsystem, to include the power turn on and initialization of the CPU and MMU.

5. State the purpose and function of the individual CRT pages.

6. State the operational characteristics and caphlities of the individual CRT pages.

7. Describe the operator interaction necessary to input and or extract data via the front panel controls of the individual CRT pages.

8. Describe the Fire Control Threat Motion Analysis problem.

9. State the operational characteristics and capabilities of the TMA page

10. Describe the operator interaction necessary to solve the TMA problem via the TMA page.

11 Define System Solutions and their applications to the total SFCS.

12 State the purpose of the Weapon Control Subsystem.

13 Describe the functional and operational characteristics and capbilities of the Weapon Control Subsystem and its associated CRT pages

14 Describe the operator actions required to preform all pre-launch, firing, and postlaunch activites for all weapon types, in both Normal, Emergency and Modes of Operation

B. STUDY ASSIGNMENT

1. Read ABR 5297, CHP3, SECT 1 and 2.

Ques: How many tactical operations may be performed by the CDC operator? List four of them

ANS: _____

_____

_____

_____

_____

2. Ques: What printer/plotter speeds are available?

Ans: _____

_____

_____

3. Ques: What operator actions are required to send an "Ivestigate Bearing Command"?

Ans: _____

_____

_____

_____

_____

_____

_____

_____

_____

ASSIGNMENT SHEET 4-6-1

4. Ques: What operator actions are required to "Nominate a Threat"? (assume tracks ave been designated).

Ans: _____

5. Ques: Which operator's action initiates the Automatic TMA processing?

Ans: _____

6. Ques: What operator actions are required to "Call-Up" the SVP display page when the TBP display page is presented on the CRT?

Ans: _____

7. Ques: How many stationary targets can be displayed on the TPD page?

Ans: _____

ASSIGNMENT SHEET 4-6-1

8. Ques: How many tests are listed on the test page? List them

Ans: _____

_____

_____

_____

9. Ques: How often is the System Solution, when it is an Automatic TMA solution, updated?

Ans: _____

_____

10. Ques: How many manual modes of TMA are avaiable to the operator? List them.

Ans: _____

_____

_____

_____

11. Ques: What are the primary advantages and disadvantages of the manual Normal Mode TMA?

Ans: _____

_____

_____

_____

_____

12. Ques: After Choosing a Target, Assigning a Weapon Type, how many tubes may be allocated for a MK8, UGM-84, MK48 Weapons?

Ans: _____

_____

ASSIGNMENT SHEET 4-6-1

13. Ques: Inthe allocation of tubes, what is the definition of the "Tube Availability"?

Ans: _____

_____

_____

_____

_____

14. Ques: What is the purpose of the "X10" switch when using the joystick to send weapon postlaunch commands?

Ans: _____

_____

_____

_____

JOB SHEET 7-1-1

OPERATION OF RAN SFCS MK1 MOD1 COMMAND DISPLAY SUBSYSTEM

A. INTRODUCTION

This job sheet provides you with your first real operator involement in the processing of targets. As this is your "initial hands on" application with the RAN SFCS, this job sheet also includes the preoperational checks, power on, and power off sequences for the SFCS.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR 5297

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet you will be required to have the instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR:_____" note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

JOB SHEET 7-1-1

Step 1. Perform RAN SECS Preoperational Checks and Procedures. (Use CHP3 , ABR5297).

Ques: What is the status of the CDC power panel 115V, 400Hz and 24VDC circuit breakers upon completion of the preoperational checks and procedures?

Ans: _____

_____

_____

Step 2. Perfrom System Power Initialization Procedures.(Use ABR5297 CHP3).

Ques: What is the speed of the printer/plotter paper upon completion of the system intialization procedures?

Ans: _____

_____

_____

_____

Step 3: Perform CDC Time Bearing Plot Operating Procedures. (Use ABR5297 Table 3-2-2)

Ques: What is the sequence of operator actions required to designate track #30 on Attacker Channel B? (Assume valid data is available and last track designated was #12).

Ans: _____

_____

_____

_____

_____

Step 4. Perform CDC Printer/Plotter Operating Procedures. (Use ABR5297 Table 3-2-2).

Ques: What is the action required to obtain Ranger printouts on the CDC plot?

Ans: _____

JOB SHEET 7-1-1

Step 4.(cont)

Ques: What is the purpose of the "SLEW" switch on the CDC plotter control panel?

Ans: _____

_____

_____

INSTR_____

Step 5. Perform CDC System Status Monitoring Operating Procedures. (Use ABR5297 Table 3-2-1).

Step 6. Perform System Power Turn Off Procedures. (Use ABR5297 CHP3).

INSTR_____

JOB SHEET 9-1-1

OPERATION OF RAN SFCS, MK1 MOD1 FIRE CONTROL CONSOLES

A. INTRODUCTION

This job sheet provides you with "HANDS ON" application of the front panel controls of the FCC. Operation of these controls is essential to your further studies in the processing of targets.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will required to have your instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR_____" note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

Step 1. Perform RAN SFCS Preoperational Checks and Procedures and System Power Initialization Procedures. (Use ABR5297 CHP3).

INSTR_____

Step 2. At the CRT viewing area, perform the following operation adjustments

a. Rotate the Brightness control fully counter-clockwise and then fully clockwise. As a final setting, position the control to approximately mid-range

b. Rotate the STATIC FOCUS control fully counter clockwise and then fully clockwise. As a final setting, position the control to appoximately mid-range.

c. Rotate the PANEL ILLUMINATION control fully counter clockwise and then fully clockwise. As a final setting, position the control to approximately mid-range

d. Rotate the TOTE ILLUMINATION control fully counter clockwise and the fully clockwise. As a final setting, position the control to appoximately mid-range.

JOB SHEET 9-1-1

Step 2.(cont)

Ques: What is the effect of rotating the STATIC FOCUS control?

Ans: _____

_____

_____

INSTR_____

Step 3. At the FCC desk unit, perform the following operations:

a. Depress the TBP call-up switch.

Ques: Which display page is presented on the CRT viewing area?

Ans: _____

_____

b. Depress the TPD call-up switch.

Ques: Which page is presented on the CRT viewing area?

Ans: _____

_____

c. Depress the RAY call-up switch.

Ques: Which page is presented in the CRT viewing area?

Ans: _____

_____

d. Depress the TBP call-up switch.

Ques: Which page is presented in the CRT viewing area?

Ans: _____

_____

Ques: Which encoders (by name) are available to the FCC operator when interacting with the TBP CRT display page?

Ans: _____

_____

_____

e. Depress the TPD call-up switch.

Ques: Which encoders (by name) are available to the FCC operator when interacting with the TPD CRT dispaly page?

Ans: _____

_____

_____

INSTR_____

Step 4. With the TPD CRT display page presented, preform the following operations.

a. Using the Lightpen and Enter pushbutton, select REL as the diplay mode.

b. Using the Lightpen, Arrow Switch, and Enter pushbutton, select CG for classification of the first nominated threat.

c. Using the Lightpen, Numeric Keyboard, and Enter pushbutton, enter 450 feet as the target length.

d. Using the L and R encoders, reposition the CRT display so that Own Ship is depicated as being in the lower left-hand corner

INSTR_____

JOB SHEET 9-1-1

Step 5. Select TRNG as the operating mode by:

a. At the TWFCSI, select TRNG on the Mode select Switch.

b. Ensure the Mode Switch on the non-active FCC is set to "TACT".

c. At the CDC Status and Nomination Panel, depress the SYS CLR pushbutton.

d. At the active FCC desk unit, depress the TRNG pushbutton.

Ques: Which CRT display page is presented on the CRT viewing area?

Ans: _____

_____

INSTR_____

Step 6. Select TEST as the operating mode by:

a. At the TWFSCI, select TEST on the Mode Select Switch.

b. Ensure the Mode Select Switch on the non-active FCC is set to TACT.

c. Perform a load at the CPU.

INSTR_____

Step 7. Perform TEST MODE operating Procedures. (Use ABR5297 CHP6).

INSTR_____

Step 8. Reconfigure the SFCS to the Normal Mode.

INSTR_____

JOB SHEET 9-1-1

Step 9. At the TWFSCI(s), Choose a target, Assign a weapon type, and Allocate tube(s). (Use ABR 5297 Table 3-2-5).

Ques: How many TWFSCI assignment panels are needed to conduct a two-target attack?

Ans: _____

_____

INSTR_____

Step 10. At the active FCC, depress the WDC call-up switch.

Ques: What are the initialization states for the W/GY weapon "MODE" and "TACTIC".

Ans: _____

_____

_____

INSTR_____

Step 11. Using the Lightpen and the Arrow Switch, review the following optional enteries for the W/GY weapon:

a. TRAJ

b. SRCH

c. CEIL

d. FLOOR

e. DEPTH

f. PITCH

INSTR_____

Step 12. Perform the remaining weapon and tube preparatins and fire weapons as directed. (ABR5297, Table 3-2-5)

INSTR_____

JOB SHEET 7-1-1

Step 13. Perform the following W/GY weapon postlaunch activities:

a. Change the weapon's "MODE" to "CI".

b. Using the joystick, steer the weapon left or right 40 degrees

c. Using the joystick, steer the weapon back to the corrected course.

d. Change the weapon's "MODE" to "BR".

e. When directed, terminate the engagement by depressing the appropriate "CHOOSE" switch a second time.

INSTR_____

Step 14. Recall the WCD CRT display page and prefrom all prelaunch, firing, and postlaunch activities for all weapon types.

INSTR_____

Step 15. Perform all prelaunch, firing, and postlaunch activities for all weapon types in the SECONDARY Mode. (Use ABR5297 VOL1 PT1 CHP3 SECT2.62 PG347).

INSTR_____

Step 16. Perform System Power Turn-off Procedures.

INSTR_____

JOB SHEET 13-1-1

MAINTENANCE OPERATION OF RAN SFCS MK1 MOD1
SENSOR DATA CONVERTOR

A. INTRODUCTION

This job sheet provides you with practical application in various maintenance operations of the Sensor Data Convetor. These operations are an integral part of fault analysis and as such are essential to your further studies in corrective maintenance of the Sensor Data Convertor.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297
2. ABR5310

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will required to have your instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR_____" note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

Step 1. Using ABR 5297, VOL1, CHP3, SECT2, Perform RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS to the TEST Mode.

INSTR_____

Step 2. Using ABR 5297, VOL1, CHP6, SECT3, perform Sensor Data Convertor Off-line diagnostic tests DT1 through DT10

INSTR_____

Step 3. Using ABR5310, VOL1, CHP2, SECT3, perform the following Sensor Data Convertor Maintenance Panel operations:

a. Initialization/unit Select

b. Implement/examine all Ef words; Read and Write Memory.

c. Restoration to Normal Mode.

INSTR_____

Step 4. Using ABR5297, VOL1, PT1, CHP3, SECT3, perform System Power Turn Off Procedures.

INSTR_____

JOB SHEET 13-1-2

CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1
SENSOR DATA CONVERTOR

A. INTRODUCTION

This job sheet provides you with "hands on" experience in fault analysis routines and corrective maintenance tasks of the Sensor Data Convertor. As this is your first experience in trouble-shooting and repair of the Sensor Data Convertor (SDC), the frist four problems are sequenced to accomplish detection, localization, isolation, and correction by: (1) Off-line; (2) On-line fault monitoring; (3) Indicator faults; and (4) Maintenance Panel routines. This serves to familiarize you with the various techniques available in fault analysis and correction of of the SDC. Thereafter, you will be required to solve the remaining problems using those detection, localization, isolation, and correction routines thet you may deem appropriate.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297

2. ABR5310

3. NAVELEX 1427-0001-4

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will be required to have the instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR":_____ note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

JOB SHEET 13-1-2

Step 1. Using ABR5297, CHP3, SECT2, prefrom RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS in the TEST Mode.

Step 2. Using ABR5297, VOL1, CHP6, SECT3, perform SDC Off-line Diagnostic Tests, DT1 Through DT10 or until an error is detected.

INSTR_____

Step 3. When and error is detected, refer to ABR5297 CHP6, SECT3, Error Exit Table 6-3-5, for a description of the fault and corrective action.

Step 4. Observing all personnel and equipment safety precautions, perform action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5310, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5310, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: Which Diagnostic Test failed?

Ans: _____

_____

Ques: What Error Code was displayed at the CRT?

Ans: _____

_____

INSTR_____

Step 5. Perform SDC Off-line diagnostic Tests, DT1 through DT10 to verify fault correction.

Step 6. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position

JOB SHEET 13-1-2

Step 7. Configure the SFCS to the Normal Mode.

INSTR_____

Step 8. When an On-line fault monitor Error Code is displayed on the CRT's, refer to ABR5297, CHP6, SECT1, On-line Error Exit Table 6-1-1,and On-line fault page, for a description of the fault and the corrective action required.

a. If directed to perform System level DT's, refer to ABR5297 CHP6, SECT3, and re-configure the SFCS to the Test Mode.

b. If System level DT's are performed and an Error Code, which denotes failure of a test, is displayed, refer to ABR5297, CHP6, SECT3 Error Exit Table 6-3-5, for a description of the fault and corrective action required.

c. If directed to perform Equipment level DT's refer to ABR5310, VOL2,CHP5, SECT3, or NAVLEX 1427-0001-4

d. If Equipment level DT's are performed and an Error is noted or a procedural step is failed,refer to ABR5310, VOL2, CHP5, SECT3, Fault Location Tables 5-4.1 and 5-4.2 (Table 5-4.2 may further refer to the Microprocessor Error Code Table 5-4.4).

JOB SHEET 13-1-2

Step 9. Observing all personnel and equipment safety precautions, perform action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ARR5310, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ARR5310, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: What On-line fault monitor Error Code was displayed?

Ans: _____

_____

Ques: What LRU was at fault?

Ans: _____

_____

INSTR_____

Step 10. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position.

Step 11. Re-configure the SECS to the Normal Mode and verify that the On-line fault monitor Error Code is no longer displayed.

INSTR_____

Step 12. When improper operation or failure of an indicator is observed , refer to ARR5297, CHP6, SECT1, Fault Directory Table6-1.2, for the Diagnostic Test(s) to be performed and related maintenance Diagrams

Step 13. As directed in Step 12, preform Diagnostic Test(s) to complete fault isolation and effect fault correction. (Repeat Steps 8a through 10 as applicable; disregarding the questions in Step 9b).

Ques: Which indicator was observed as having improper operation or failure?

JOB SHEET 13-1-2

Step 13. Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

INSTR_____

Step 14. Verfiy thet the Indicator, observed as having improper operation or failure, is now operating properly.

INSTR_____

Step 15. Using ABR5310, VOL2, CHP5, SECT3, perform Equipment level DT's 1 and 2.

Step 16. When an error is noted or a procedural step is failed, refer to ABR5310, VOL2, CHP5, SECT3 Maintenance Panel Fault Location Table 5-4.2, for a description of the error and corrective action(s) required. (Table 5-4.2 may further to the Microprocessor Error Code Table 5-4.4).

Step 17. Perfrom action(s) as directed in Step 16, referring to Steps 9a and 9b as necessary to complete fault isolation and effect fault correction.

Ques: What error was observed or procedural step failed during the conduct of DT2?

Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

JOB SHEET 13-1-2

Step 18. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position and configure the SFCS to the Normal Mode.

INSTR_____

Step 19. Observing all personnel and equipment safety precautions, perform fault detection, localization, isolation, and correction routines necessary to solve the remaining corrective maintenance problems of the SDC.

INSTR_____

ASSIGNMENT SHEET 13-1-1

MAINTENANCE OF THE SENSOR DATA CONVERTOR

A. OBJECTIVES

Upon successful completion of these topics, you will able to:

1. Describe the physical composition of the SDC.

2. Describe, to the logic diagram level, the functional charateristics of the circuits within the SDC.

3. Describe the operational maintenance procedures and tasks required to perform fault analysis and corrections of the SDC.

B. STUDY ASSIGNMENT

1. Read ABR5310, VOL1, CHP1-3

2. Read ABR5310, VOL2, CHP4-7

3. Read ABR5297, VOL1, CHP6, SECT1

4. Read ABR5297, VOL1, CHP6 SECT3

Ques: Which Technical Manuals contain the following items as they pertain to the SDC ?

Ans: a.Maintenance Panel operating procedures

_____

b.On-line Error Exit Table

_____

c.Off-line System level Diagnostic Testing procedures

_____

d.System level Diagnostic Test Error Exit Tables

_____

e. Indicator Fault Directory

_____

ASSIGNMENT SHEET 13-1-1

f. Equipment level Diagnostic Testing procedures

g. Equipment level Power Initialization Fault location Table

h. Maintenance Panel Fault Location Table

i. Microprocessor error Code Table

j. Service Positioning procedures

k. Parts Location Table

ASSIGNMENT SHEET 13-1-1

Ques: Which SDC EF Word (by number) pertains to Ranger Data?

Ans: _____

Ques: What data is retained in SDC Buffer Memory locations A178 and 179

Ans: _____

Ques: When reviewing the Attacker Status and Data Word Formats, what is the value of TGT 1's CRS when the input data bits are listed below?

$\frac{11}{0}$ $\frac{10}{0}$ $\frac{9}{1}$ $\frac{8}{0}$ $\frac{7}{0}$ $\frac{6}{0}$ $\frac{5}{0}$ $\frac{4}{0}$ $\frac{3}{0}$ $\frac{2}{0}$ $\frac{1}{0}$ -

Ans: _____

Ques: Which PIA(s) is are/programmed to process SDC/CPU NTDS interface data?

_____

PERFORMANCE TEST 13-1-1
CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1

A. INTRODUCTION

1. This job sheet serves as your performance test. It provides a measure of your knowledge and ability in the corrective maintenance of the RAN SFCS MK1 MOD1 SDC.

2. As you progress through this test, you will be required to perfrom fault detection, locatlization, isolation, and correction as required to restore each equipment to its full operational capabilities.

3. In the conduct of this test, and as assigned by the instructor, you may be tested indivdually or as a member of a maintenance "team". Regardless, each individual will be graded on his contribution to the corrective maintenance effort. Particular emphasis will be placed on the following:

   a. Absolute adherance to all personnel and equipment safety precautions.

   b. Proper selections and use of appropriate technical references.

   c. Logical and timely progression through the fault analysis process. (No maintenance effort will be premitted to exceed a 30 minute time interval).

4. As you proceed through this test, you will be required to list (on separate paper) the following for each fault:

   a. Means of detection

   b. Technical documentation used.

   c. Final LRU at fault and subsequently replaced.

B. TEST

Proceed to the RAN SFCS lab and perfrom fault analysis and correction an all problems inserted by the instructor.

JOB SHEET 15-1-1

MAINTENANCE OPERATION OF RAN SFCS MK1 MOD1
COMMAND DISPLAY AND SONAR ASSIGNMENT UNITS

A. INTRODUCTION

This job sheet provides you with practical application in various maintenance operations of the COMMAND DISPLAY and SAU's These operations are an integral part of fault analysis and as such are essential to your further studies in corrective maintenance of the COMMAND DISPLAY and SAU's.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297
2. ABR5310

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will required to have your instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR_____" note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

Step 1.Using ABR 5297, VOL1, CHP3, SECT2, Preform RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS to the TEST Mode.

INSTR_____

Step 2. Using ABR 5297, VOL1, CHP6, SECT3,perform Command Display and SAU's Off-line diagnostic tests DT1 through DT9

INSTR_____

Step 3. Using ABR5310, VOL1, CHP2, SECT3, perform the following Command Display and SAU's Maintenance Panel operations:

a. Initialization/unit Select

b. Implement/examine all Ef words; Read and Write Memory.

c. CDC and SAU Indicator Status Check

d. CD Switch Status Check

e. Printter/Plotter Operations

f. Restoration to Normal Mode.

INSTR_____

Step 4. Using ABR5297, VOL1, PT1, CHP3, SECT3, perform System Power Turn Off Procedures.

INSTR_____

JOB SHEET 15-1-2

CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1
COMMAND DISPLAY and SONAR ASSIGNMENT UNITS

A. INTRODUCTION

This job sheet provides you with "hands on" experience in fault analysis routines and corrective maintenance tasks of the Command Display and SAU's. As this is your first experience in trouble-shooting and repair of the Command Display and SAU's, the frist four problems are sequenced to accomplish detection, localization, isolation, and correction by: (1) Off-line; (2) On-line fault monitoring; (3) Indicator faults; and (4) Maintenance Panel routines. This serves to familiarize you with the various techniques available in fault analysis and correction of of the CDC. Thereafter, you will be required to solve the remaining problems using those detection, localization, isolation, and correction routines thet you may deem appropriate.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297

2. ABR5310

3. NAVELEX 1427-0001-4

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will be required to have the instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR":_____ note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

JOB SHEET 15-1-2

Step 1. Using ABR5297, CHP3, SECT2, perform RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS in the TEST Mode.

Step 2. Using ABR5297, VOL1, CHP6, SECT3, perform CDC Off-line Diagnostic Tests, DT1 Through DT9 or until an error is detected.

INSTR_____

Step 3. When and error is detected, refer to ABR5297 CHP6, SECT3, Error Exit Table 6-3-5, for a description of the fault and corrective action.

Step 4. Observing all personnel and equipment safety precautions, perform action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5310, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5310, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: Which Diagnostic Test failed?

Ans: _____

_____

Ques: What Error Code was displayed at the CRT?

Ans: _____

_____

INSTR_____

Step 5. Perform CDC Off-line diagnostic Tests, DT1 through DT9 to verify fault correction.

Step 6. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position

JOB SHEET 15-1-2

Step 7. Configure the SFCS to the Normal Mode.

INSTR_____

Step 8. When an On-line fault monitor Error Code is displayed on the CRT's, refer to ABR5297, CHP6, SECT1, On-line Error Exit Table 6-1-1,and On-line fault page, for a description of the fault and the corrective action required.

a. If directed to perform System level DT's, refer to ABR5297 CHP6, SECT3, and re-configure the SFCS to the Test Mode.

b. If System level DT's are performed and an Error Code, which denotes failure of a test, is displayed, refer to ABR5297, CHP6, SECT3 Error Exit Table 6-3-1, for a description of the fault and corrective action required.

c. If directed to perform Equipment level DT's refer to ABR5310, VOL2,CHP5, SECT3, or NAVLEX 1427-0001-4

d. If Equipment level DT's are performed and an Error is noted or a procedural step is failed,refer to ABR5310, VOL2, CHP5, SECT3, Fault Location Tables 5-4.1 and 5-4.2 (Table 5-4.2 may further refer to the Microprocessor Error Code Table 5-4.4).

JOB SHEET 15-1-2

Step 9. Observing all personnel and equipment safety precautions, perform action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5310, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5310, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: What On-line fault monitor Error Code was displayed?

Ans: _____

_____

Ques: What LRU was at fault?

Ans: _____

_____

INSTR_____

Step 10. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position.

Step 11. Re-configure the SFCS to the Normal Mode and verify that the On-line fault monitor Error Code is no longer displayed.

INSTR_____

Step 12. When improper operation or failure of an indicator is observed , refer to ABR5297, CHP6, SECT1, Fault Directory Table6-1.2, for the Diagnostic Test(s) to be performed and related maintenance Diagrams

Step 13. As directed in Step 12, perform Diagnostic Test(s) to complete fault isolation and effect fault correction. (Repeat Steps 8a through 10 as applicable; disregarding the questions in Step 9b).

Ques: Which indicator was observed as having improper operation or failure?

Step 13. Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

INSTR_____

Step 14. Verfiy thet the Indicator, observed as having improper operation or failure, is now operating properly.

INSTR_____

Step 15. Using ABR5310, VOL2, CHP5, SECT3, perform Equipment level DT's 1 and 2.

Step 16. When an error is noted or a procedural step is failed, refer to ABR5310, VOL2, CHP5, SECT3 Maintenance Panel Fault Location Table 5-4.2, for a description of the error and corrective action(s) required. (Table 5-4.2 may further to the Microprocessor Error Code Table 5-4.4).

Step 17. Perfrom action(s) as directed in Step 16, referring to Steps 9a and 9b as necessary to complete fault isolation and effect fault correction.

Ques: What error was observed or procedural step failed during the conduct of DT??

Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

Step 18. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position and configure the SFCS to the Normal Mode.

INSTR_____

Step 19. Observing all personnel and equipment safety precautions, perform fault detection, localization, isolation, and correction routines necessary to solve the remaining corrective maintenance problems of the SDC.

INSTR_____

JOB SHEET 15-1-3
ALINGMENT/ADJUSTMENT OF THE RAN SFCS MK1 MOD1
PRINTER/PLOTTER

A. INTRODUCTION

This job sheet provides you with practical experience in the alignment/adjustment of the Printer/Plotter.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5310, VOL2, CHP6, SECT3

D. JOB STEPS

Step 1. Using ABR5310, VOL2, CHP6, SECT3 preform the following Printer/Plotter alignment/adjustment procedures:

a. Printer print head

b. Printer paper drive

c. Horizational motor drive

d. Vertical motor drive

e. Horizontal encoder

f. Vertical encoder

INSTR_____

ASSIGNMENT SHEET 15-1-1

MAINTENANCE OF THE COMMAND DISPLAY AND SONAR ASSIGNMENT UNITS

A. OBJECTIVES

Upon successful completion of these topics, you will able to:

1. Describe the physical composition of the CDC.

2. Describe, to the logic diagram level, the functional characteristics of the circuits within the CDC.

3. Describe the operational maintenance procedures and tasks required to perform fault analysis and corrections of the CDC.

B. STUDY ASSIGNMENT

1. Read ABR5310, VOL1, CHP1-3

2 Read ABR5310, VOL2, CHP4-7

3. Read ABR5297, VOL1, CHP6, SECT1

4. Read ABR5297, VOL1, CHP6 SECT3

Ques: Which Technical Manuals contain the following items as they pertain to the SDC ?

Ans: a.Maintenance Panel operating procedures

_____

b.On-line Error Exit Table

_____

c.Off-line System level Diagnostic Testing procedures

_____

d.System level Diagnostic Test Error Exit Tables

_____

e. Indicator Fault Directory

_____

ASSIGNMENT SHEET 15-1-1

f. Equipment level Diagnostic Testing procedures

_____

g. Equipment level Power Initialization Fault location Table

_____

h. Maintenance Panel Fault Location Table

_____

i. Microprocessor error Code Table

_____

j. Service Positioning procedures

_____

k. Parts Location Table

_____

Ques: On which CPU channel are communications between the CPU and CD processed

Ans: _____

_____

Ques: Which CD EF Word (by number) pertains to the CD Indicator Functions?

Ans: _____

_____

Ques: When reviewing the CDC Switch Interrupts, which Function Code and associated Modifer is sent to the CPU when the SEARCHER STATUS "A" switch-indicator is pressed?

PERFORMANCE TEST 15-1-1
CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1

A. INTRODUCTION

1. This job sheet serves as your performance test. It provides a measure of your knowledge and ability in the corrective maintenance of the RAN SFCS MK1 MOD1 CDC.

2. As you progress through this test, you will be required to perform fault detection, localization, isolation, and correction as required to restore each equipment to its full operational capabilities.

3. In the conduct of this test, and as assigned by the instructor, you may be tested indivdually or as a member of a maintenance "team". Regardless, each individual will be graded on his contribution to the corrective maintenance effort. Particular emphasis will be placed on the following:

   a. Absolute adherance to all personnel and equipment safety precautions.

   b. Proper selections and use of appropriate technical references.

   c. Logical and timely progression through the fault analysis process. (No maintenance effort will be premitted to exceed a 30 minute time interval).

4. As you proceed through this test, you will be required to list (on separate paper) the following for each fault:

   a. Means of detection

   b. Technical documentation used.

   c. Final LRU at fault and subsequently replaced.

B. TEST

Proceed to the RAN SFCS lab and perfrom fault analysis and correction an all problems inserted by the instructor.

JOB SHEET 17-1-1

MAINTENANCE OPERATION OF RAN SFCS MK1 MOD1
RECORD/REPRODUCE

A. INTRODUCTION

This job sheet provides you with practical application in various maintenance operations of the Record/Reproduce. These operations are an integral part of fault analysis and as such are essential to your further studies in corrective maintenance of the Record/Reproduce.

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297
2. ABR5310

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will required to have your instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR_____" note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

Step 1. Using ABR 5297, VOL1, CHP3, SECT2, Perform RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS to the TEST Mode.

INSTR_____

Step 2. Using ABR 5297, VOL1, CHP6, SECT3, perform Recorder/Reproduce Off-line diagnostic tests DT1 through DT2

INSTR_____

Step 3. Using ABR5310, VOL1, CHP2, SECT3, perform the following Recorder/Reproduce Maintenance Panel operations:

a. Initialization/unit Select

b. Read and Write Memory.

c. Restoration to Normal Mode.

INSTR_____

Step 4. Using ABR5297, VOL1, PT1, CHP3, SECT3, perfrom System Power Turn Off Procedures.

INSTR_____

JOB SHEET 17-1-2

CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1
RECORD/REPRODUCE

A. INTRODUCTION

This job sheet provides you with "hands on" experience in fault analysis routines and corrective maintenance tasks of the Recroder/Reproduce As this is your first experience in trouble-shooting and repair of the recorder/reproduce (RR), the frist four problems are sequenced to accomplish detection, localization, isolation, and correction by: (1) Off-line; (2) On-line fault monitoring; (3) Indicator faults; and (4) Maintenance Panel routines. This serves to familiarize you with the various techniques available in fault analysis and correction of of the RR. Thereafter, you will be required to solve the remaining problems using those detection, localization, isolation, and correction routines thet you may deem appropriate.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297

2. ABR5310

3. NAVELEX 1427-0001-4

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will be required to have the instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR":_____ note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

JOB SHEET 13-1-2

Step 1. Using ABR5297, CHP3, SECT2, perform RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS in the TEST Mode.

Step 2. Using ABR5297, VOL1, CHP6, SECT3, perform RR Off-line Diagnostic Tests, DT1 Through DT2 or until an error is detected.

INSTR_____

Step 3. When and error is detected, refer to ABR5297 CHP6, SECT3, Error Exit Table 6-3-6, for a description of the fault and corrective action.

Step 4. Observing all personnel and equipment safety precautions, perform action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5310, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5310, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: Which Diagnostic Test failed?

Ans: _____

_____

Ques: What Error Code was displayed at the CRT?

Ans: _____

_____

INSTR_____

Step 5. Perform RR Off-line diagnostic Tests, DT1 through DT2 to verify fault correction.

Step 6. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position

JOB SHEET 17-1-2

Step 7. Configure the SFCS to the Normal Mode.

INSTR_____

Step 8. When an On-line fault monitor Error Code is displayed on the CRT's, refer to ABR5297, CHP6, SECT1, On-line Error Exit Table 6-1-1, and On-line fault page, for a description of the fault and the corrective action required.

a. If directed to perform System level DT's, refer to ABR5297 CHP6, SECT3, and re-configure the SFCS to the Test Mode.

b. If System level DT's are performed and an Error Code, which denotes failure of a test, is displayed, refer to ABR5297, CHP6, SECT3 Error Exit Table 6-3-6, for a description of the fault and corrective action required.

c. If directed to perform Equipment level DT's refer to ABR5310, VOL2, CHP5, SECT3, or NAVLEX 1427-0001-4

d. If Equipment level DT's are performed and an Error is noted or a procedural step is failed, refer to ABR5310, VOL2, CHP5, SECT3, Fault Location Tables 5-4.1 and 5-4.2 (Table 5-4.2 may further refer to the Microprocessor Error Code Table 5-4.4).

JOB SHEET 17-1-2

Step 9. Observing all personnel and equipment safety precautions, perform action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5310, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5310, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: What On-line fault monitor Error Code was displayed?

Ans: _____

_____

Ques: What LRU was at fault?

Ans: _____

_____

INSTR_____

Step 10. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position.

Step 11. Re-configure the SFCS to the Normal Mode and verify that the On-line fault monitor Error Code is no longer displayed.

INSTR_____

Step 12. When improper operation or failure of an indicator is observed , refer to ABR5297, CHP6, SECT1, Fault Directory Table6-1.2, for the Diagnostic Test(s) to be performed and related maintenance Diagrams

Step 13. As directed in Step 12, preform Diagnostic Test(s) to complete fault isolation and effect fault correction. (Repeat Steps 8a through 10 as applicable; disregarding the questions in Step 9b).

Ques: Which indicator was observed as having improper operation or failure?

Step 13. Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

INSTR_____

Step 14. Verfiy thet the Indicator, observed as having improper operation or failure, is now operating properly.

INSTR_____

Step 15. Using ABR5310, VOL2, CHP5, SECT3, perform Equipment level DT's 1 and 2.

Step 16. When an error is noted or a procedural step is failed, refer to ABR5310, VOL2, CHP5, SECT3 Maintenance Panel Fault Location Table 5-4.2, for a description of the error and corrective action(s) required. (Table 5-4.2 may further to the Microprocessor Error Code Table 5-4.4).

Step 17. Prefrom action(s) as directed in Step 16, referring to Steps 9a and 9b as necessary to complete fault isolation and effect fault correction.

Ques: What error was observed or procedural step failed during the conduct of DT2?

Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

JOB SHEET 17-1-2

Step 18. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position and configure the SFCS to the Normal Mode.

INSTR_____

Step 19. Observing all personnel and equipment safety precautions, perform fault detection, localization, isolation, and correction routines necessary to solve the remaining corrective maintenance probelms of the RR.

INSTR_____

ASSIGNMENT SHEET 17-1-1

RECORDER/ REPRODUCE

A. OBJECTIVES

Upon successful completion of these topics, you will able to:

1. Describe the physical composition of the RR.

2. Describe, to the logic diagram level, the functional charateristics of the circuits within the RR.

3. Describe the operational maintenance procedures and tasks required to prefrom fault analysis and corrections of the RR.

B. STUDY ASSIGNMENT

1. Read ABR5310, VOL1, CHP1-3

2 Read ABR5310, VOL2, CHP4-7

3. Read ABR5297, VOL1, CHP6, SECT1

4. Read ABR5297, VOL1, CHP6 SECT3

Ques: Which Technical Manuals contain the following items as they pertain to the RR?

Ans: a.Maintenance Panel operating procedures

_____

b.On-line Error Exit Table

_____

c.Off-line System level Diagnostic Testing procedures

_____

d.System level Diagnostic Test Error Exit Tables

_____

e. Indicator Fault Directory

_____

ASSIGNMENT SHEET 17-1-1

f. Equipment level Diagnostic Testing procedures

g. Equipment level Power Initialization Fault location Table

h. Maintenance Panel Fault Location Table

i. Microprocessor error Code Table

j. Service Positioning procedures

k. Parts Location Table

ASSIGNMENT SHEET 17-1-1

Ques: On which CPU channel are communications between the CPU and the R/R Unit processed?

Ans: _____

_____

Ques: What is the result of an "erase" Command, immediately followed by a "HALT" command, as to the data written on the R/R Unit Magnetic Tape?

Ans: _____

_____

Ques: In which direction is the R/R Unit's Magnetic Tape moving during "WRITE" operations?

Ans: _____

_____

PERFORMANCE TEST 13-1-1
CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1

A. INTRODUCTION

1. This job sheet serves as your performance test. It provides a measure of your knowledge and ability in the corrective maintenance of the RAN SFCS MK1 MOD1 RR.

2. As you progress through this test, you will be required to perform fault detection, localization, isolation, and correction as required to restore each equipment to its full operational capabilities.

3. In the conduct of this test, and as assigned by the instructor, you may be tested individually or as a member of a maintenance "team". Regardless, each individual will be graded on his contribution to the corrective maintenance effort. Particular emphasis will be placed on the following:

   a. Absolute adherance to all personnel and equipment safety precautions.

   b. Proper selections and use of appropriate technical references.

   c. Logical and timely progression through the fault analysis process. (No maintenance effort will be premitted to exceed a 30 minute time interval).

4. As you proceed through this test, you will be required to list (on separate paper) the following for each fault:

   a. Means of detection

   b. Technical documentation used.

   c. Final LRU at fault and subsequently replaced.

B. TEST

Proceed to the RAN SFCS lab and perform fault analysis and correction an all problems inserted by the instructor.

JOB SHEET 19-1-1

MAINTENANCE OPERATION OF RAN SFCS MK1 MOD1
FIRE CONTROL CONSOLE TUBE WEAPON FIRE CONTROL STATUS INDICATOR

A. INTRODUCTION

This job sheet provides you with practical application in various maintenance operations of the FCC TWFCSI. These operations are an integral part of fault analysis and as such are essential to your further studies in corrective maintenance of the FCC TWFCSI.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297
2. ABR5309

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will required to have your instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR_____" note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

Step 1. Using ABR 5297, VOL1, CHP3, SECT2, Perform RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS to the TEST Mode.

INSTR_____

Step 2. Using ABR 5297, VOL1, CHP6, SECT4, perform FCC TWFCSI Off-line diagnostic tests DT1 through DT9.

INSTR_____

Step 3. Using ABR5309, VOL1, CHP2, SECT3, perform the following FCC TWFCSI Maintenance Panel operations:

a. Initialization/unit Select

b. Implement/examine all Ef words; Read and Write Memory.

c. Write/Read TOTE Refresh Memory

d. Write Character string to TOTE Display

e. Write all TOTE Characters

f. TWFCSI Indicator Test

g. TWFCSI Switch Test

h. Restoration to Normal Mode.

INSTR_____

Step 4. Using ABR5297, VOL1, PT1, CHP3, SECT3, perform System Power Turn Off Procedures.

INSTR_____

JOB SHEET 19-1-?

CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1
FIRE CONTROL TUBE WEAPON FIRE CONTROL STATUS INDICATOR

A. INTRODUCTION

This job sheet provides you with "hands on" experience in fault analysis routines and corrective maintenance tasks of the FCC TWFCSI. As this is your first experience in trouble-shooting and repair of the FCC TWFCSI, the frist four problems are sequenced to accomplish detection, localization, isolation, and correction by: (1) Off-line; (2) On-line fault monitoring; (3) Indicator faults; and (4) Maintenance Panel routines. This serves to familiarize you with the various techniques available in fault analysis and correction of of the FCC. Thereafter, you will be required to solve the remaining problems using those detection, localization, isolation, and correction routines thet you may deem appropriate.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297

2. ABR5309

3. NAVELEX 1427-0001-4

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will be required to have the instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR":_____ note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

JOB SHEET 19-1-2

Step 1. Using ABR5297, CHP3, SECT2, perform RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS in the TEST Mode.

Step 2. Using ABR5297, VOL1, CHP6, SECT4, perform FCC Off-line Diagnostic Tests, DT1 through DT9 or until an error is detected.

INSTR_____

Step 3. When and error is detected, refer to ABR5297 CHP6, SECT4, Error Exit Table 6-4.1, for a description of the fault and corrective action.

Step 4. Observing all personnel and equipment safety precautions, pre-form action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5309, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5309, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: Which Diagnostic Test failed?

Ans: _____

_____

Ques: What Error Code was displayed at the CRT?

Ans: _____

_____

INSTR_____

Step 5. Preform FCC Off-line diagnostic Tests, DT1 through DT9 to verify fault correction.

Step 6. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position

JOB SHEET 19-1-2

Step 7. Configure the SFCS to the Normal Mode.

INSTR_____

Step 8. When an On-line fault monitor Error Code is displayed on the CRT's, refer to ABR5297, CHP6, SECT1, On-line Error Exit Table 6-1-1, and On-line fault page, for a description of the fault and the corrective action required.

a. If directed to perform System level DT's, refer to ABR5297 CHP6, SECT4, and re-configure the SFCS to the Test Mode.

b. If System level DT's are performed and an Error Code, which denotes failure of a test, is displayed, refer to ABR5297, CHP6, SECT4 Error Exit Table 6-3.1, for a description of the fault and corrective action required.

c. If directed to perform Equipment level DT's refer to ABR5309, VOL2, CHP5, SECT3, or NAVLEX 1427-0001-4

d. If Equipment level DT's are performed and an Error is noted or a procedural step is failed, refer to ABR5309, VOL2, CHP5, SECT3, Fault Location Tables 5-4.1 and 5-4.2 (Table 5-4.2 may further refer to the Microprocessor Error Code Table 5-4.3).

JOB SHEET 19-1-2

Step 9. Observing all personnel and equipment safety precautions, perform action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5309, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5310, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: What On-line fault monitor Error Code was displayed?

Ans: _____

_____

Ques: What LRU was at fault?

Ans: _____

_____

INSTR_____

Step 10. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position.

Step 11. Re-configure the SECS to the Normal Mode and verify that the On-line fault monitor Error Code is no longer displayed.

INSTR_____

Step 12. When improper operation or failure of an indicator is observed , refer to ABR5297, CHP6, SECT1, Fault Directory Table6-1.2, for the Diagnostic Test(s) to be preformed and related maintenance Diagrams

Step 13. As directed in Step 12, perform Diagnostic Test(s) to complete fault isolation and effect fault correction. (Repeat Steps 8a through 10 as applicable; disregarding the questions in Step 9b).

Ques: Which indicator was observed as having improper operation or failure?

Step 13. Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

INSTR_____

Step 14. Verfiy thet the Indicator, observed as having improper operation or failure, is now operating properly.

INSTR_____

Step 15. Using ABR5309, VOL2, CHP5, SECT3, perform Equipment level DT's 1 and 2.

Step 16. When an error is noted or a procedural step is failed, refer to ABR5309, VOL2, CHP5, SECT3 Maintenance Panel Fault Location Table 5-4.2, for a description of the error and corrective action(s) required. (Table 5-4.2 may further to the Microprocessor Error Code Table 5-4.3).

Step 17. Perform action(s) as directed in Step 16, referring to Steps 9a and 9b as necessary to complete fault isolation and effect fault correction.

Ques: What error was observed or procedural step failed during the conduct of DT2?

Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

Step 18. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position and configure the SFCS to the Normal Mode.

INSTR_____

Step 19. Observing all personnel and equipment safety precautions, perform fault detection, localization, isolation, and correction routines necessary to solve the remaining corrective maintenance probelms of the FCC.

INSTR_____

ASSIGNMENT SHEET 19-1-1

MAINTENANCE OF THE FCC TUBE WEAPON

FIRE CONTROL STATUS INDICATOR

A. OBJECTIVES

Upon successful completion of these topics, you will able to:

1. Describe the physical composition of the FCC.

2. Describe, to the logic diagram level, the functional charateristics of the circuits within the FCC.

3. Describe the operational maintenance procedures and tasks required to prefrom fault analysis and corrections of the FCC.

B. STUDY ASSIGNMENT

1. Read ABR5309, VOL1, CHP1-3

2 Read ABR5309, VOL2, CHP4-7

3. Read ABR5297, VOL1, CHP6, SECT1

4. Read ABR5297, VOL1, CHP6 SECT3

Ques: Which Technical Manuals contain the following items as they pertain to the FCC ?

Ans: a.Maintenance Panel operating procedures

_____

b.On-line Error Exit Table

_____

c.Off-line System level Diagnostic Testing procedures

_____

d.System level Diagnostic Test Error Exit Tables

_____

e. Indicator Fault Directory

_____

ASSIGNMENT SHEET 19-1-1

f. Equipment level Diagnostic Testing procedures

g. Equipment level Power Initialization Fault location Table

h. Maintenance Panel Fault Location Table

i. Microprocessor error Code Table

j. Service Positioning procedures

k. Parts Location Table

ASSIGNMENT SHEET 19-1-1

Ques: On which CPU channels are communications between FCC TWFCSI Right and Left and the CPU processed?

Ans: _____

Ques: How many constraints exsit in the control of data transfer from the TWFCSI to the WDC?

Ans: _____

Ques: Which EF Word is required to initiate data transfer from the WDC to the FCC TWFCSI?

Ans: _____

Ques: How many WDC EF Words are required to transfer the W/GY and SALVO weapon Gyro Angle Orders? What are they?

_____

PERFORMANCE TEST 19-1-1
CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1

A. INTRODUCTION

1. This job sheet serves as your performance test. It provides a measure of your knowledge and ability in the corrective maintenance of the RAN SFCS MK1 MOD1 FCC.

2. As you progress through this test, you will be required to perfrom fault detection, locatlization, isolation, and correction as required to restore each equipment to its full operational capabilities.

3. In the conduct of this test, and as assigned dy the instructor, you may be tested indivdually or as a member of a maintenance "team". Regardless, each individual will be graded on his contribution to the corrective maintenance effort. Particular emphasis will be placed on the following:

   a. Absolute adherance to all personnel and equipment safety precautions.

   b. Proper selections and use of appropriate technical references.

   c. Logical and timely progression through the fault analysis process. (No maintenance effort will be premitted to exceed a 30 minute time interval).

4. As you proceed through this test, you will be required to list (on separate paper) the following for each fault:

   a. Means of detection

   b. Technical documentation used.

   c. Final LRU at fault and subsequently replaced.

B. TEST

Proceed to the RAN SFCS lab and prefrom fault analysis and correction an all problems inserted by the instructor.

JOB SHEET 21-1-1

MAINTENANCE OPERATION OF RAN SFCS MK1 MOD1
FIRE CONTROL CONSOLE CATHODE RAY TUBE

A. INTRODUCTION

This job sheet provides you with practical application in various maintenance operations of the Cathode Ray Tube. These operations are an integral part of fault analysis and as such are essential to your further studies in corrective maintenance of the Cathode Ray Tube.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297
2. ABR5309

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will required to have your instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR_____" note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

Step 1. Using ABR 5297, VOL1, CHP3, SECT2, Perform RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS to the TEST Mode.

INSTR_____

Step 2. Using ABR 5297, VOL1, CHP6, SECT4, perform Cathode Ray Tube Off-line diagnostic tests DT10 through DT18

INSTR_____

Step 3. Using ABR5309, VOL1, CHP2, SECT4, perform the following Cathode Ray Tube Maintenance Panel operations:

a. Initialization/unit Select

b. Implement/examine all RF words; Read and Write Memory.

c. Light Pen Interrupt Status Check

d. Switch Status Check

e. Encoder Status Check

f. Restoration to Normal Mode

INSTR_____

Step 4. Using ABR5297, VOL1, PT1, CHP3, SECT3, perform System Power Turn Off Procedures.

INSTR_____

JOB SHEET 21-1-2

CORRECTIVE MAINTENANCE OF RAN SPCS MK1 MOD1

FIRE CONTROL CONSOLE CATHODE RAY TUBE

A. INTRODUCTION

This job sheet provides you with "hands on" experience in fault analysis routines and corrective maintenance tasks of the Cathode Ray Tube. As this is your first experience in trouble-shooting and repair of the Cathode Ray Tube (CRT), the frist four problems are sequenced to accomplish detection, localization, isolation, and correction by: (1) Off-line; (2) On-line fault monitoring; (3) Indicator faults; and (4) Maintenance Panel routines. This serves to familiarize you with the various techniques available in fault analysis and correction of of the CRT. Thereafter, you will be required to solve the remaining problems using those detection, localization, isolation, and correction routines thet you may deem appropriate.

B. EQUIPMENT

1. RAN SPCS MK1 MOD1

C. REFERENCES

1. ABR5297

2. ABR5309

3. NAVELEX 1427-0001-4

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will be required to have the instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR":_____ note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

JOB SHEET 21-1-2

Step 1. Using ABR5297, CHP3, SECT2, perfrom RAN SPCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SPCS in the TEST Mode.

Step 2. Using ABR5297, VOL1, CHP6, SECT4, perform CRT Off-line Diagnostic Tests, DT10 Through DT18 or until an error is detected.

INSTR_____

Step 3. When and error is detected, refer to ABR5297 CHP6, SECT4, Error Exit Table 6-4.1, for a description of the fault and corrective action.

Step 4. Observing all personnel and equipment safety precautions, pre-form action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5309, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5309, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: Which Diagnostic Test failed?

Ans: _____

_____

Ques: What Error Code was displayed at the CRT?

Ans: _____

_____

INSTR_____

Step 5. Perform CRT Off-line diagnostic Tests, DT10 through DT18 to verify fault correction.

Step 6. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position

Step 7. Configure the SFCS to the Normal Mode.

INSTR_____

Step 8. When an On-line fault monitor Error Code is displayed on the CRT's, refer to ABR5297, CHP6, SECT1, On-line Error Exit Table 6-1-1,and On-line fault page, for a description of the fault and the corrective action required.

a. If directed to perform System level DT's, refer to ABR5297 CHP6, SECT4, and re-configure the SFCS to the Test Mode.

b. If System level DT's are performed and an Error Code, which denotes failure of a test, is displayed, refer to ABR5297, CHP6, SECT4 Error Exit Table 6-3-1, for a description of the fault and corrective action required.

c. If directed to perform Equipment level DT's refer to ABR5309, VOL2,CHP5, SECT3, or NAVLEX 1427-0001-4

d. If Equipment level DT's are performed and an Error is noted or a procedural step is failed,refer to ABR5309, VOL2, CHP5, SECT3, Fault Location Tables 5-4.1 and 5-4.2 (Table 5-4.2 may further refer to the Microprocessor Error Code Table 5-4.4).

JOB SHEET 21-1-2

Step 9. Observing all personnel and equipment safety precautions, perform action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5309, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5309, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: What On-line fault monitor Error Code was displayed?

Ans: _____

_____

Ques: What LRU was at fault?

Ans: _____

_____

INSTR_____

Step 10. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position.

Step 11. Re-configure the SFCS to the Normal Mode and verify that the On-line fault monitor Error Code is no longer displayed.

INSTR_____

Step 12. When improper operation or failure of an indicator is observed , refer to ABR5297, CHP6, SECT1, Fault Directory Table6-1.4, for the Diagnostic Test(s) to be performed and related maintenance Diagrams

Step 13. As directed in Step 12, perform Diagnostic Test(s) to complete fault isolation and effect fault correction. (Repeat Steps 8a through 10 as applicable; disregarding the questions in Step 9b).

Ques: Which indicator was observed as having improper operation or failure?

JOB SHEET 21-1-2

Step 13. Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

INSTR_____

Step 14. Verfiy thet the Indicator, observed as having improper operation or failure, is now operating properly.

INSTR_____

Step 15. Using ABR5309, VOL2, CHP5, SECT3, perform Equipment level DT's 1 and 2.

Step 16. When an error is noted or a procedural step is failed, refer to ABR5309, VOL2, CHP5, SECT3 Maintenance Panel Fault Location Table 5-4.2, for a description of the error and corrective action(s) required. (Table 5-4.2 may further to the Microprocessor Error Code Table 5-4.4).

Step 17. Prefrom action(s) as directed in Step 16, referring to Steps 9a and 9b as necessary to complete fault isolation and effect fault correction.

Ques: What error was observed or procedural step failed during the conduct of DT2?

Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

Step 18. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position and configure the SFCS to the Normal Mode.

INSTR_____

Step 19. Observing all personnel and equipment safety precautions, perform fault detection, localization, isolation, and correction routines necessary to solve the remaining corrective maintenance problems of the CRT.

INSTR_____

JOB SHEET 21-1-3

ALIGNMENT OF THE RAN SECS MK1 MOD1

FCC CATHODE RAY TUBE

A. INTRODUCTION

This job sheet provides you with practical experience in the alignment/adjustment of the FCC CRT

B. EQUIPMENT

1. RAN SECS MK1 MOD1

C. REFERENCES

1. ABR5309, VOL2, CHP6, SECT3

D. JOB STEPS

STEP 1. Using ABR5309, VOL2, CHP6, SECT3, perform the following FCC CRT alignment/adjustment procedures:

a. Major deflection amplifier current limiting and centering.

b. Deflection and linearity correction

c. Intensity and contrast

d. Focus

INSTR_____

ASSIGNMENT SHEET 21-1-1

MAINTENANCE OF THE CATHODE RAY TUBE

A. OBJECTIVES

Upon successful completion of these topics, you will able to:

1. Describe the physical composition of the CRT.

2. Describe, to the logic diagram level, the functional charateristics of the circuits within the CRT.

3. Describe the operational maintenance procedures and tasks required to prefrom fault analysis and corrections of the CRT.

B. STUDY ASSIGNMENT

1. Read ABR5309, VOL1, CHP1-3

2 Read ABR5309, VOL2, CHP4-7

3. Read ABR5297, VOL1, CHP6, SECT1

4. Read ABR5297, VOL1, CHP6 SECT3

Ques: Which Technical Manuals contain the following items as they pertain to the CRT ?

Ans: a.Maintenance Panel operating procedures

_____

b.On-line Error Exit Table

_____

c.Off-line System level Diagnostic Testing procedures

_____

d.System level Diagnostic Test Error Exit Tables

_____

e. Indicator Fault Directory

_____

ASSIGNMENT SHEET 21-1-1

f. Equipment level Diagnostic Testing procedures

g. Equipment level Power Initialization Fault location Table

h. Maintenance Panel Fault Location Table

i. Microprocessor error Code Table

j. Service Positioning procedures

k. Parts Location Table

ASSIGNMENT SHEET 21-1-1

Ques: On which CPU channels are communications between the FCC CRT Right and Left and the CPU processed?

Ans: _____

_____

Ques: List the 10 types of display words received and stored in the CRT Refresh Buffer Memory?

Ans: _____

_____

_____

_____

_____

_____

Ques: In reviewing the FCC CRT Symbol Word Formats, what is the size of the "Symbol" when Bit 25 of the word is a logic "low"?

Ans: _____

_____

PERFORMANCE TEST 13-1-1
CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1

A. INTRODUCTION

1. This job sheet serves as your performance test. It provides a measure of your knowledge and ability in the corrective maintenance of the RAN SFCS MK1 MOD1 CRT.

2. As you progress through this test, you will be required to perfrom fault detection, localization, isolation, and correction as required to restore each equipment to its full operational capabilities.

3. In the conduct of this test, and as assigned by the instructor, you may be tested indivdually or as a member of a maintenance "team". Regardless, each individual will be graded on his contribution to the corrective maintenance effort. Particular emphasis will be placed on the following:

   a. Absolute adherance to all personnel and equipment safety precautions.

   b. Proper selections and use of appropriate technical references.

   c. Logical and timely progression through the fault analysis process. (No maintenance effort will be premitted to exceed a 30 minute time interval).

4. As you proceed through this test, you will be required to list (on separate paper) the following for each fault:

   a. Means of detection

   b. Technical documentation used.

   c. Final LRU at fault and subsequently replaced.

B. TEST

Proceed to the RAN SFCS lab and perfrom fault analysis and correction an all problems inserted by the instructor.

JOB SHEET 23-1-1

MAINTENANCE OPERATION OF RAN SFCS MK1 MOD1
WEAPON DATA CONVERTOR AND TUBE ORDER AND ALARM DEVICE

A. INTRODUCTION

This job sheet provides you with practical application in various maintenance operations of the Weapon Data Convetor. These operations are an integral part of fault analysis and as such are essential to your further studies in corrective maintenance of the Weapon Data Convertor.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297
2. ABR5311

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will required to have your instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR_____" note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

Step 1. Using ABR 5297, VOL1, CHP3, SECT2, Perform RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS to the TEST Mode.

INSTR_____

Step 2. Using ABR 5297, VOL1, CHP6, SECT5,perform Weapon Data Convertor Off-line diagnostic tests DT1 through DT10

INSTR_____

Step 3. Using ABR5311, VOL1, CHP2, SECT4, perform the following Weapon Data Convertor Maintenance Panel operations:

a. Initialization/unit Select

b. Loop Test

c. TOAD TEST

d. MK48 INTERNAL

e. MK48 LOOPBACK

f. MK48 WEAPON

g. UGM84 INTERNAL

h. UGM84 LOOPBACK

i. UGM84 WEAPON

j. MK8 WEAPON

k. MK48 PRE-FIRING INTERFACE

INSTR_____

Step 4. Using ABR5297, VOL1, PT1, CHP3, SECT2, perform System Power Turn Off Procedures.

INSTR_____

JOB SHEET 23-1-2

CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1
WEAPON DATA CONVERTER AND TUBE ORDER AND ALARM DEVICE

A. INTRODUCTION

This job sheet provides you with "hands on" experience in fault analysis routines and corrective maintenance tasks of the Weapon Data Convertor. As this is your first experience in trouble-shooting and repair of the Weapon Data Convertor (WDC), the frist four problems are sequenced to accomplish detection, localization, isolation, and correction by: (1) Off-line; (2) On-line fault monitoring; (3) Indicator faults; and (4) Maintenance Panel routines. This serves to familiarize you with the various techniques available in fault analysis and correction of of the WDC. Thereafter, you will be required to solve the remaining problems using those detection, localization, isolation, and correction routines thet you may deem appropriate.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297

2. ABR5311

3. NAVELEX 1427-0001-4

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will be required to have the instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR": _____ note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

JOB SHEET 23-1-2

Step 1. Using ABR5297, CHP3, SECT2, perform RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS in the TEST Mode.

Step 2. Using ABR5297, VOL1, CHP6, SECT3, perform WDC Off-line Diagnostic Tests, DT1 Through DT10 or until an error is detected.

INSTR_____

Step 3. When and error is detected, refer to ABR5297 CHP6, SECT3, Error Exit Table 6-3-5, for a description of the fault and corrective action.

Step 4. Observing all personnel and equipment safety precautions, perform action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5311, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5311, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: Which Diagnostic Test failed?

Ans: _____

_____

Ques: What Error Code was displayed at the CRT?

Ans: _____

_____

INSTR_____

Step 5. Perform WDC Off-line diagnostic Tests, DT1 through DT10 to verify fault correction.

Step 6. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position

Step 7. Configure the SFCS to the Normal Mode.

INSTR_____

Step 8. When an On-line fault monitor Error Code is displayed on the CRT's, refer to ABR5297, CHP6, SECT1, On-line Error Exit Table 6-1-1,and On-line fault page, for a description of the fault and the corrective action required.

a. If directed to perform System level DT's, refer to ABR5297 CHP6, SECT5, and re-configure the SFCS to the Test Mode.

b. If System level DT's are performed and an Error Code, which denotes failure of a test, is displayed, refer to ABR5297, CHP6, SECT5 Error Exit Table 6-3-5, for a description of the fault and corrective action required.

c. If directed to perform Equipment level DT's refer to ABR5311, VOL2,CHP5, SECT3, or NAVLEX 1427-0001-4

d. If Equipment level DT's are performed and an Error is noted or a procedural step is failed,refer to ABR5311, VOL2, CHP5, SECT3, Fault Location Tables 5-4.1 and 5-4.2 (Table 5-4.2 may further refer to the Microprocessor Error Code Table 5-4.4).

JOB SHEET 23-1-2

Step 9. Observing all personnel and equipment safety precautions, perform action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5311, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5311, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: What On-line fault monitor Error Code was displayed?

Ans: _____

_____

Ques: What LRU was at fault?

Ans: _____

_____

INSTR_____

Step 10. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position.

Step 11. Re-configure the SFCS to the Normal Mode and verify that the On-line fault monitor Error Code is no longer displayed.

INSTR_____

Step 12. When improper operation or failure of an indicator is observed , refer to ABR5297, CHP6, SECT1, Fault Directory Table6-1.2, for the Diagnostic Test(s) to be performed and related maintenance Diagrams

Step 13. As directed in Step 12, preform Diagnostic Test(s) to complete fault isolation and effect fault correction. (Repeat Steps 8a through 10 as applicable; disregarding the questions in Step 9b).

Ques: Which indicator was observed as having improper operation or failure?

Step 13. Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

INSTR_____

Step 14. Verfiy thet the Indicator, observed as having improper operation or failure, is now operating properly.

INSTR_____

Step 15. Using ARR5311, VOL2, CHP5, SECT3, perform Equipment level DT's 1 and 2.

Step 16. When an error is noted or a procedural step is failed, refer to ARR5311, VOL2, CHP5, SECT3 Maintenance Panel Fault Location Table 5-4.2, for a description of the error and corrective action(s) required. (Table 5-4.2 may further to the Microprocessor Error Code Table 5-4.3).

Step 17. Prefrom action(s) as directed in Step 16, referring to Steps 9a and 9b as necessary to complete fault isolation and effect fault correction.

Ques: What error was observed or procedural step failed during the conduct of DT2?

Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

Step 18. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position and configure the SFCS to the Normal Mode.

INSTR_____

Step 19. Observing all personnel and equipment safety precautions, perform fault detection, localization, isolation, and correction routines necessary to solve the remaining corrective maintenance probelms of the WDC.

INSTR_____

ASSIGNMENT SHEET 23-1-1

MAINTENANCE OF THE WEAPON DATA CONVERTOR

A. OBJECTIVES

Upon successful completion of these topics, you will able to:

1. Describe the physical composition of the WDC.

2. Describe, to the logic diagram level, the functional charateristics of the circuits within the WDC.

3. Describe the operational maintenance procedures and tasks required to perform fault analysis and corrections of the WDC.

B. STUDY ASSIGNMENT

1. Read ABR5311, VOL1, CHP1-3

2 Read ABR5311, VOL2, CHP4-7

3. Read ABR5297, VOL1, CHP6, SECT1

4. Read ABR5297, VOL1, CHP6 SECT5

Ques: Which Technical Manuals contain the following items as they pertain to the WDC ?

Ans: a.Maintenance Panel operating procedures

_____

b.On-line Error Exit Table

_____

c.Off-line System level Diagnostic Testing procedures

_____

d.System level Diagnostic Test Error Exit Tables

_____

e. Indicator Fault Directory

_____

ASSIGNMENT SHEET 23-1-1

f. Equipment level Diagnostic Testing procedures

g. Equipment level Power Initialization Fault location Table

h. Maintenance Panel Fault Location Table

i. Microprocessor error Code Table

j. Service Positioning procedures

k. Parts Location Table

ASSIGNMENT SHEET 23-1-1

Ques: Which EF word terminates WDC to TWFCSI Readback Data Transfer's?

Ans: _____

Ques: Which EF word initiates WDC to TWFCSI Readback Data Transfer's?

Ans: _____

Ques: How many interface errors can be generated in the processing of data between the WDC and the TWFCSI? List them

Ans: _____

_____

_____

_____

_____

Ques: In the review of the WDC Readback Word Format, what would be the hexadecimal code for Bits 10-8 for word 4 be when the TOAD Inventory switch for Tube 4 is set to W/GV?

Ans: _____

_____

PERFORMANCE TEST 23-1-1
CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1

A. INTRODUCTION

1. This job sheet serves as your performance test. It provides a measure of your knowledge and ability in the corrective maintenance of the RAN SFCS MK1 MOD1 WDC.

2. As you progress through this test, you will be required to perfrom fault detection, localization, isolation, and correction as required to restore each equipment to its full operational capabilities.

3. In the conduct of this test, and as assigned by the instructor, you may be tested indivdually or as a member of a maintenance "team". Regardless, each individual will be graded on his contribution to the corrective maintenance effort. Particular emphasis will be placed on the following:

   a. Absolute adherance to all personnel and equipment safety precautions.

   b. Proper selections and use of appropriate technical references.

   c. Logical and timely progression through the fault analysis process. (No maintenance effort will be premitted to exceed a 30 minute time interval).

4. As you proceed through this test, you will be required to list (on separate paper) the following for each fault:

   a. Means of detection

   b. Technical documentation used.

   c. Final LRU at fault and subsequently replaced.

B. TEST

Proceed to the RAN SFCS lab and perfrom fault analysis and correction an all problems inserted by the instructor.

JOB SHEET 25-1-1

MAINTENANCE OPERATION OF RAN SFCS MK1 MOD1
MASS MEMORY UNIT

A. INTRODUCTION

This job sheet provides you with practical application in various maintenance operations of the MASS MEMORY UNIT. These operations are an integral part of fault analysis and as such are essential to your further studies in corrective maintenance of the MASS MEMORY UNIT.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297
2. ABR5312

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will required to have your instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR_____" note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

Step 1. Using ABR 5297, VOL1, CHP3, SECT2, Perform RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS to the TEST Mode.

INSTR_____

Step 2. Using ABR 5297, VOL1, CHP6, SECT6, perform MASS MEMORY Unit Off-line diagnostic tests DT1 through DT2

INSTR _____

Step 3. Using ABR5297, VOL1, PT1, SECT2, perform System Power Turn Off procedures

INSTR _____

JOB SHEET 25-1-2

CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1
MASS MEMORY UNIT

A. INTRODUCTION

This job sheet provides you with "hands on" experience in fault analysis routines and corrective maintenance tasks of the MASS MEMORY UNIT. As this is your first experience in trouble-shooting and repair of the MASS MEMORY UNIT (MMU), the frist four problems are sequenced to accomplish detection, localization, isolation, and correction by: (1) Off-line; (2) On-line fault monitoring; (3) Indicator faults; and (4) Maintenance Panel routines. This serves to familiarize you with the various techniques available in fault analysis and correction of of the MMU. Thereafter, you will be required to solve the remaining problems using those detection, localization, isolation, and correction routines thet you may deem appropriate.

B. EQUIPMENT

1. RAN SFCS MK1 MOD1

C. REFERENCES

1. ABR5297

2. ABR5312

3. NAVELEX 1427-0001-4

D. JOB STEPS

NOTE:

After completion of certain procedural steps in this job sheet, you will be required to have the instructor verify your progress or provide assistance before you can proceed. These steps are designated with the "INSTR":_____ note. Do not proceed beyond these steps prior to obtaining the instructor's validation.

JOB SHEET 25-1-2

Step 1. Using ABR5297, CHP3, SECT2, prefrom RAN SFCS Preoperational Checks and Procedures, and System Power Initialization Procedures as required to configure the SFCS in the TEST Mode.

Step 2. Using ABR5297, VOL1, CHP6, SECT6, perform MMU Off-line Diagnostic Tests, DT1 Through DT2 or until an error is detected.

INSTR_____

Step 3. When and error is detected, refer to ABR5297 CHP6, SECT3, Error Exit Table 6-6-1, for a description of the fault and corrective action.

Step 4. Observing all personnel and equipment safety precautions, perform action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5312, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5310, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: Which Diagnostic Test failed?

Ans: _____

_____

Ques: What Error Code was displayed at the CRT?

Ans: _____

_____

INSTR_____

Step 5. Perform MMU Off-line diagnostic Tests, DT1 through DT2 to verify fault correction.

Step 6. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position

JOB SHEET 25-1-2

Step 7. Configure the SFCS to the Normal Mode.

INSTR_____

Step 8. When an On-line fault monitor Error Code is displayed on the CRT's, refer to ABR5297, CHP6, SECT1, On-line Error Exit Table 6-1-1,and On-line fault page, for a description of the fault and the corrective action required.

a. If directed to perform System level DT's, refer to ABR5297 CHP6, SECT3, and re-configure the SFCS to the Test Mode.

b. If System level DT's are performed and an Error Code, which denotes failure of a test, is displayed, refer to ABR5297, CHP6, SECT3 Error Exit Table 6-6-1, for a description of the fault and corrective action required.

c. If directed to perform Equipment level DT's refer to ABR5312, VOL2,CHP5, SECT2, or NAVLEX 1427-0001-4

d. If Equipment level DT's are performed and an Error is noted or a procedural step is failed,refer to ABR5312, VOL2, CHP5, SECT3, Fault Location Tables 5-4.1

Step 9. Observing all personnel and equipment safety precautions, perform action(s), as directed by Step 3 above, to complete fault isolation and and effect fault correction.

a. When necessary, refer to ABR5312, VOL2, CHP6, SECT1 for the Service Positioning procedures.

b. When necessary, refer to ABR5312, VOL2, CHP7, SECT2, Table 7-2-1, for Parts Location.

Ques: What On-line fault monitor Error Code was displayed?

Ans: _____

_____

Ques: What LRU was at fault?

Ans: _____

_____

INSTR_____

Step 10. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position.

Step 11. Re-configure the SECS to the Normal Mode and verify that the On-line fault monitor Error Code is no longer displayed.

INSTR_____

Step 12. When improper operation or failure of an indicator is observed , refer to ABR5297, CHP6, SECT1, Fault Directory Table6-6.1, for the Diagnostic Test(s) to be performed and related maintenance Diagrams

Step 13. As directed in Step 12, preform Diagnostic Test(s) to complete fault isolation and effect fault correction. (Repeat Steps 8a through 10 as applicable; disregarding the questions in Step 9b).

Ques: Which indicator was observed as having improper operation or failure?

Step 13. Ans: _____

_____

Ques: Which LRU was at fault?

Ans: _____

_____

INSTR_____

Step 14. Verfiy thet the Indicator, observed as having improper operation or failure, is now operating properly.

INSTR_____

Step 15. Observing all personnel and equipment safety precautions, restore all equipment to the Normal Position and configure the SFCS to the Normal Mode.

INSTR_____

Step 16. Observing all personnel and equipment safety precautions, perform fault detection, localization, isolation, and correction routines necessary to solve the remaining corrective maintenance probelms of the MMU.

INSTR_____

ASSIGNMENT SHEET 25-1-1

MAINTENANCE OF THE MASS MEMORY UNIT

A. OBJECTIVES

Upon successful completion of these topics, you will able to:

1. Describe the physical composition of the MMU.

2. Describe, to the logic diagram level, the functional charateristics of the circuits within the MMU.

3. Describe the operational maintenance procedures and tasks required to perform fault analysis and corrections of the MMU.

B. STUDY ASSIGNMENT

1. Read ABR5312, VOL1, CHP1-3

2 Read ABR5312, VOL2, CHP4-7

3. Read ABR5297, VOL1, CHP6, SECT1

4. Read ABR5297, VOL1, CHP6 SECT3

Ques: Which Technical Manuals contain the following items as they pertain to the MMU ?

a.On-line Error Exit Table

_____

b.Off-line System level Diagnostic Testing procedures

_____

c.System level Diagnostic Test Error Exit Tables

_____

d. Indicator Fault Directory

_____

ASSIGNMENT SHEET 25-1-1

e. Equipment level Diagnostic Testing procedures

f. Equipment level Power Initialization Fault location Table

g. Service Positioning procedures

h. Parts Location Table

ASSIGNMENT SHEET 25-1-1

Ques: On which CPU channel are communications between the CPU and the MMU processed?

Ans: _____

Ques: What is the primary function of the Write Shift Register in the MMU Controller (A1A15)?

Ans: _____

Ques: Of what value is the Cyclic Redundancy Check in the Write/Read operations?

Ans: _____

Ques: The four timing signals transmitted from the MEMORY DISC to the MMU controller are?

ANS: _____

_____

PERFORMANCE TEST 25-1-1
CORRECTIVE MAINTENANCE OF RAN SFCS MK1 MOD1

A. INTRODUCTION

1. This job sheet serves as your performance test. It provides a measure of your knowledge and ability in the corrective maintenance of the RAN SFCS MK1 MOD1 MMU.

2. As you progress through this test, you will be required to perfrom fault detection, localization, isolation, and correction as required to restore each equipment to its full operational capabilities.

3. In the conduct of this test, and as assigned by the instructor, you may be tested indivdually or as a member of a maintenance "team". Regardless, each individual will be graded on his contribution to the corrective maintenance effort. Particular emphasis will be placed on the following:

   a. Absolute adherance to all personnel and equipment safety precautions.

   b. Proper selections and use of appropriate technical references.

   c. Logical and timely progression through the fault analysis process. (No maintenance effort will be premitted to exceed a 30 minute time interval).

4. As you proceed through this test, you will be required to list (on separate paper) the following for each fault:

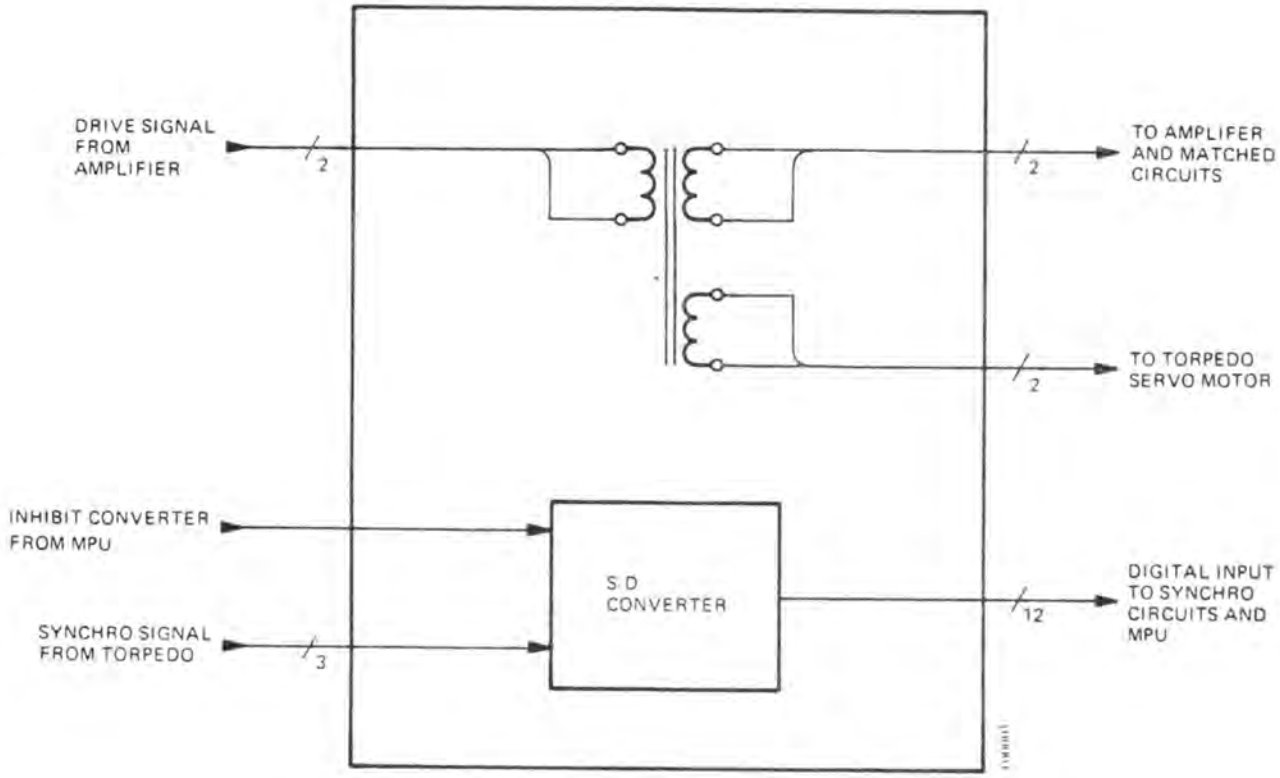
   a. Means of detection

   b. Technical documentation used.

   c. Final LRU at fault and subsequently replaced.

B. TEST

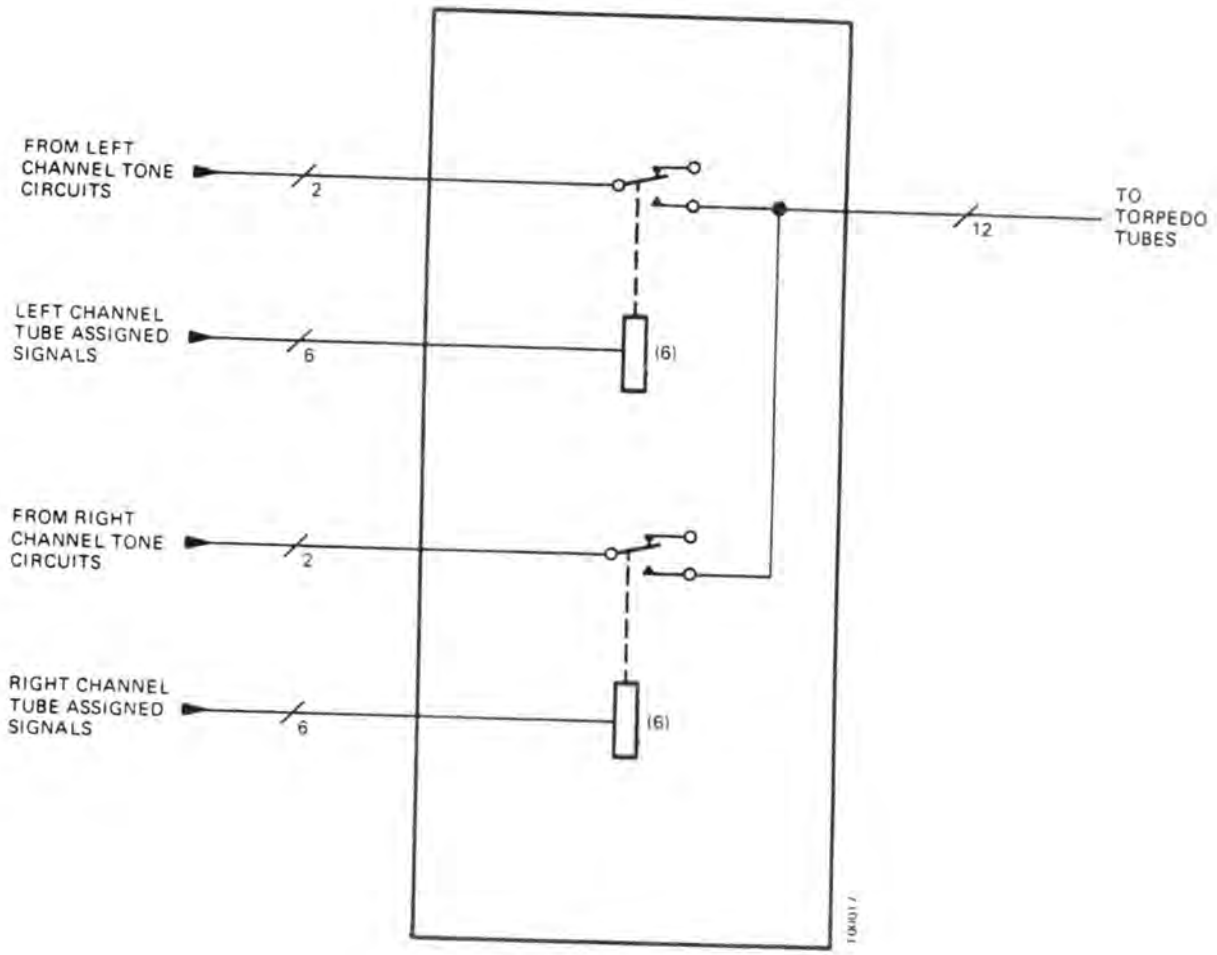
Proceed to the RAN SFCS lab and perfrom fault analysis and correction an all problems inserted by the instructor.



SYNCHRO TO DIGITAL CONVERTER MODULE

L414 000 129

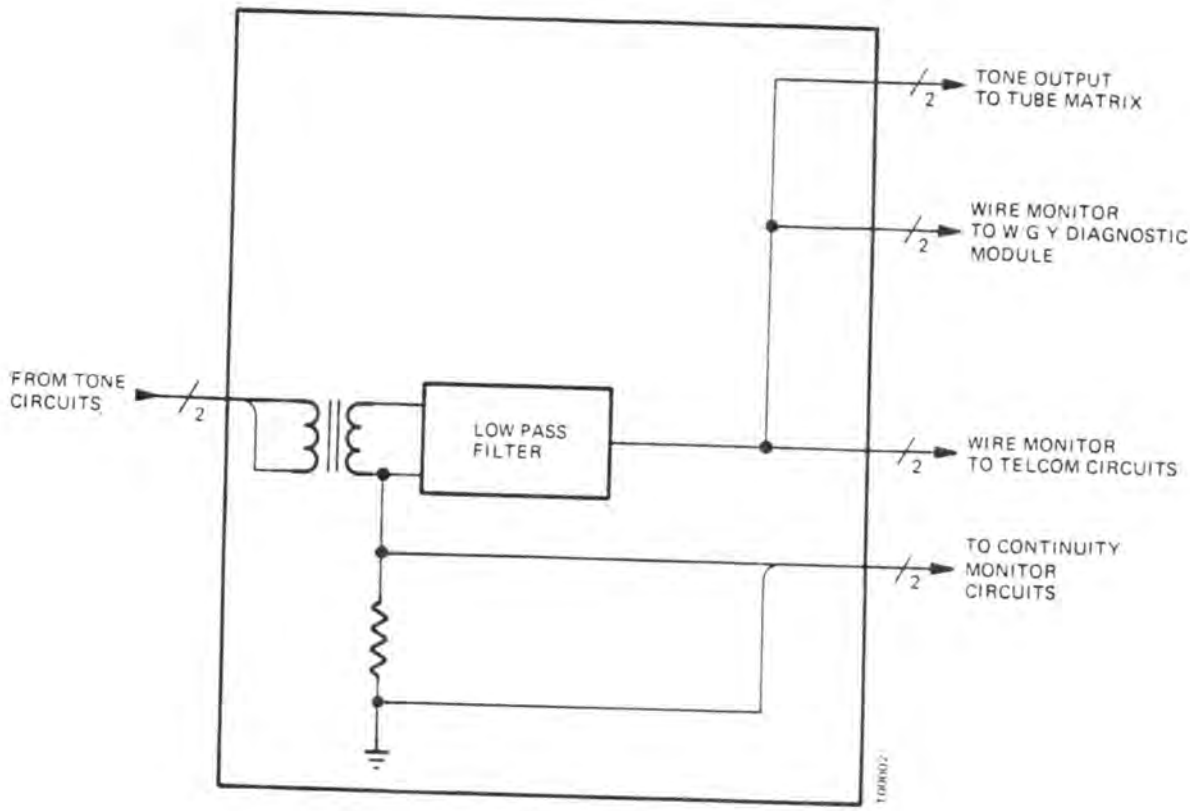
Figure 1



RELAY MODULE

L414 000 130

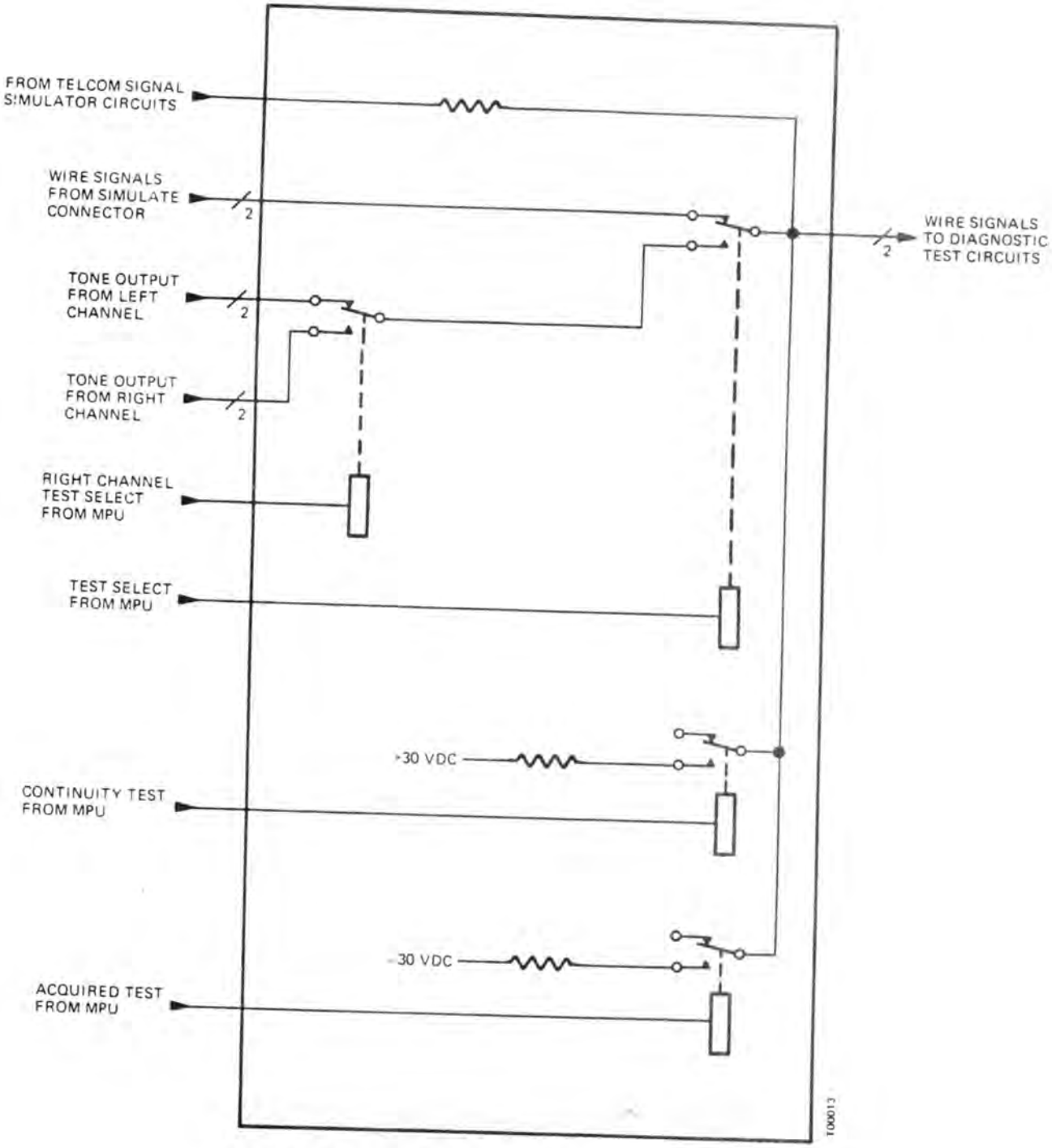
Figure 2



W/GY WIRE GUIDE MODULE

L414 000 131

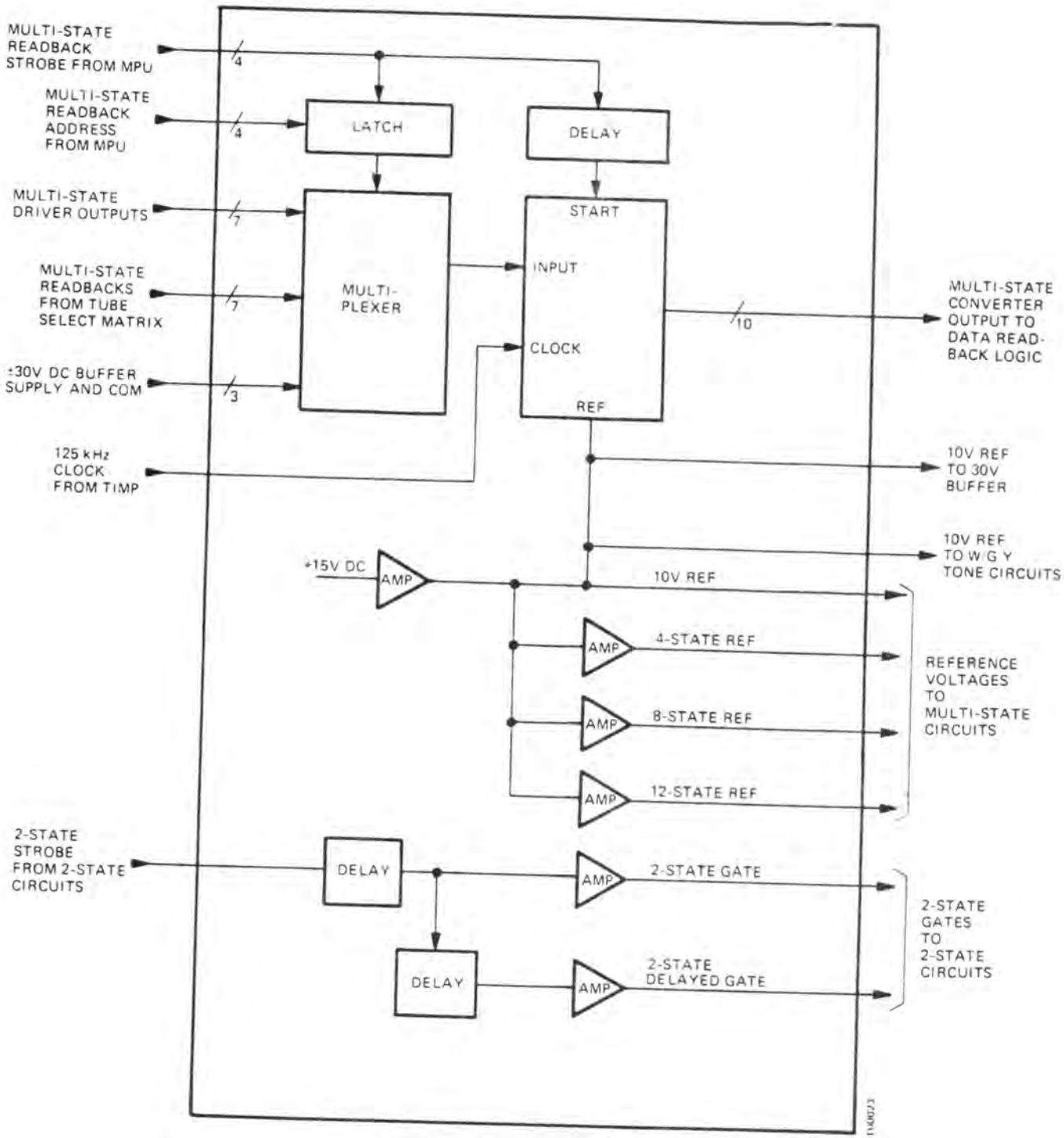
Figure 3



W GY/DIAGNOSTIC MODULE

L414 000 132

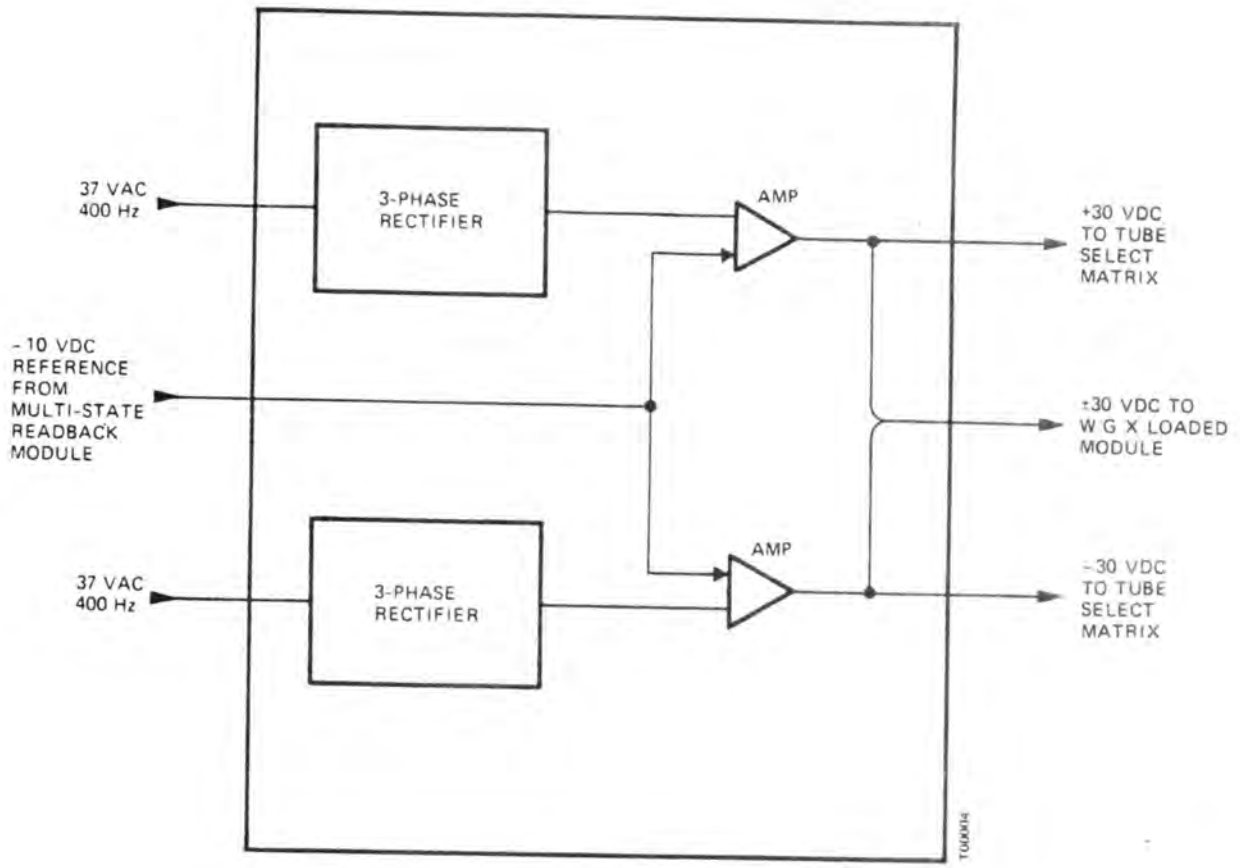
Figure 4



MULTI-STATE READBACK

L535 300 504

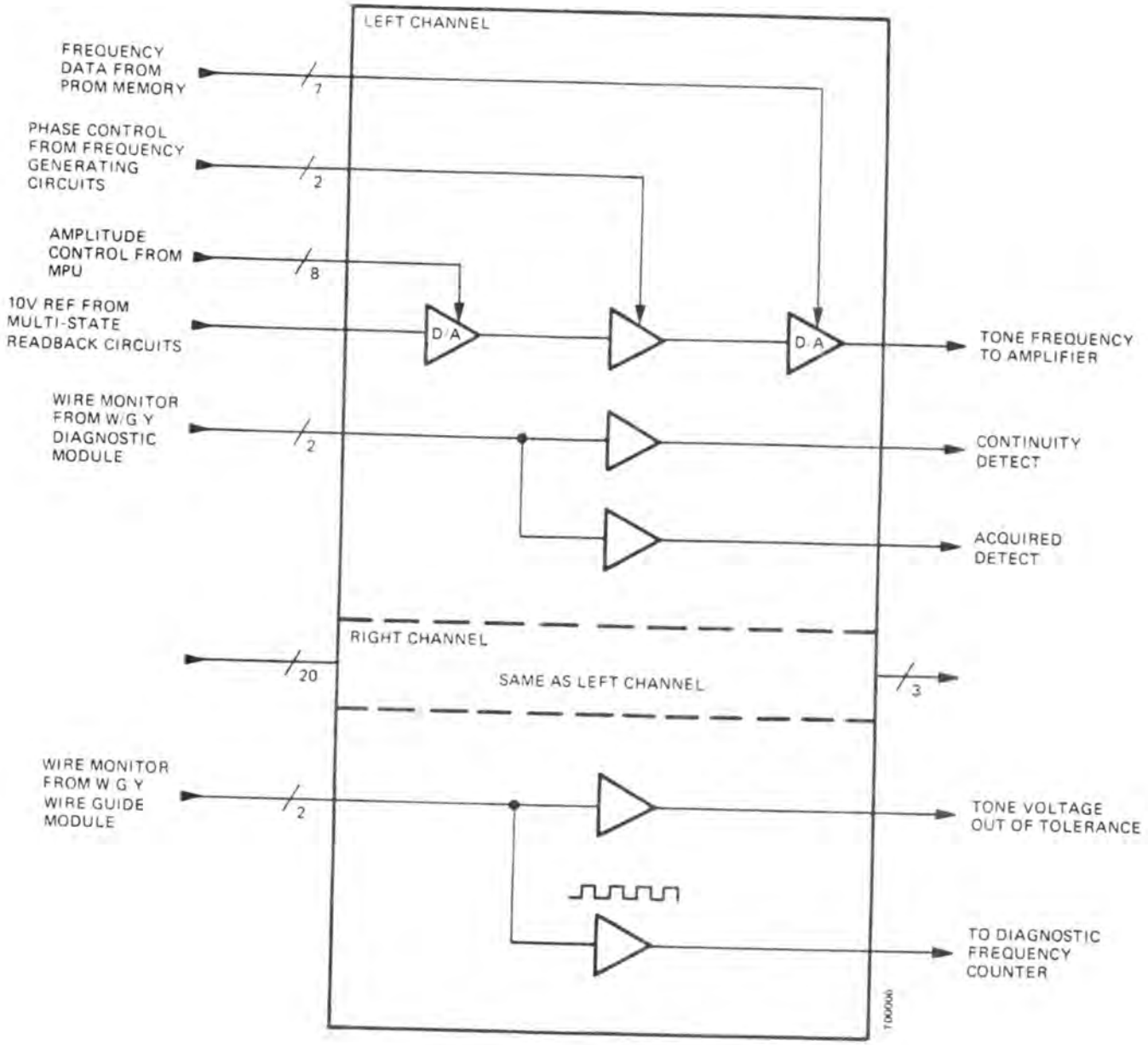
Figure 5



± 30 VDC BUFFER

L535 300 503

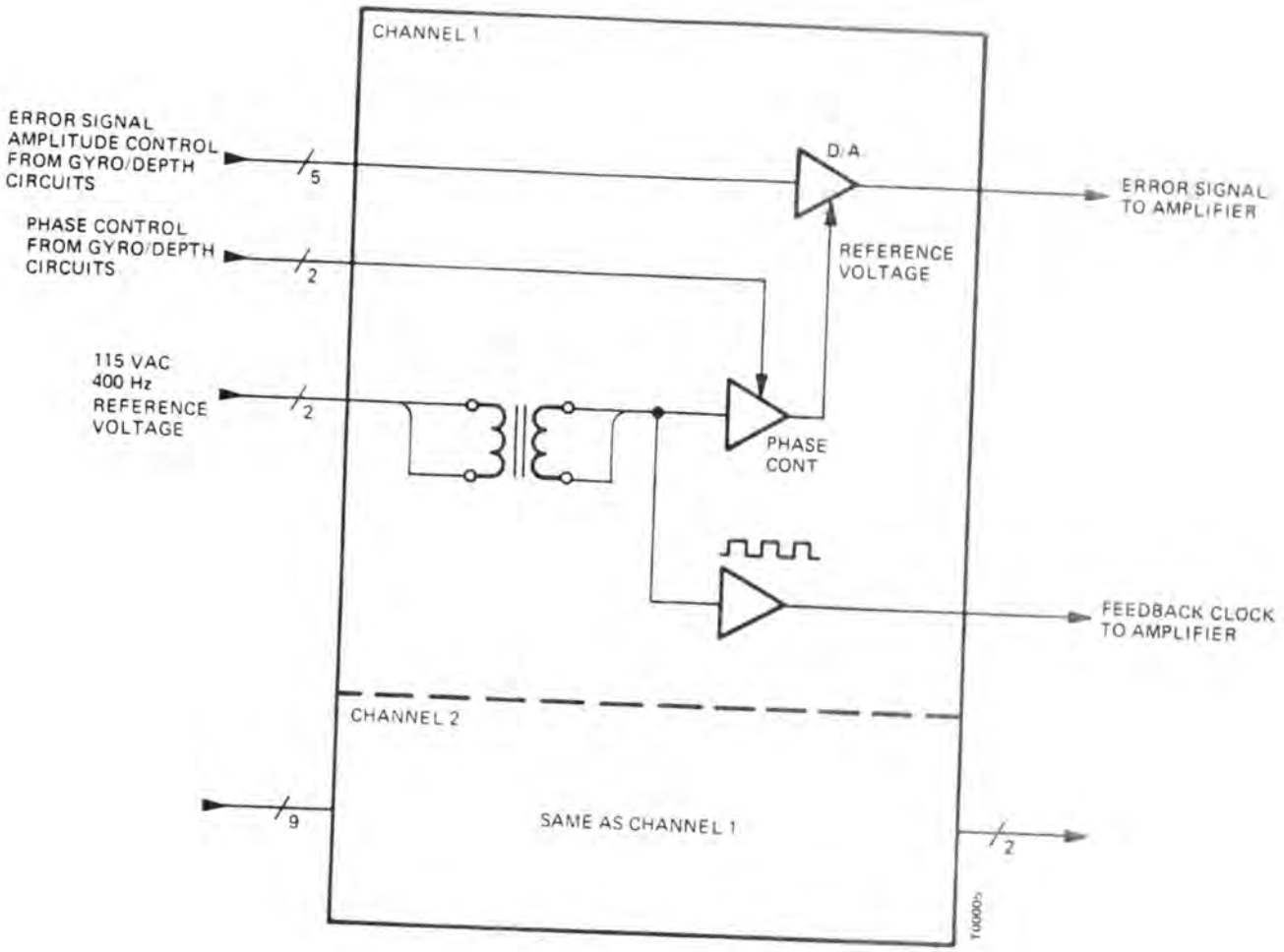
Figure 6



W/GY DIAGNOSTIC

L535 300 508

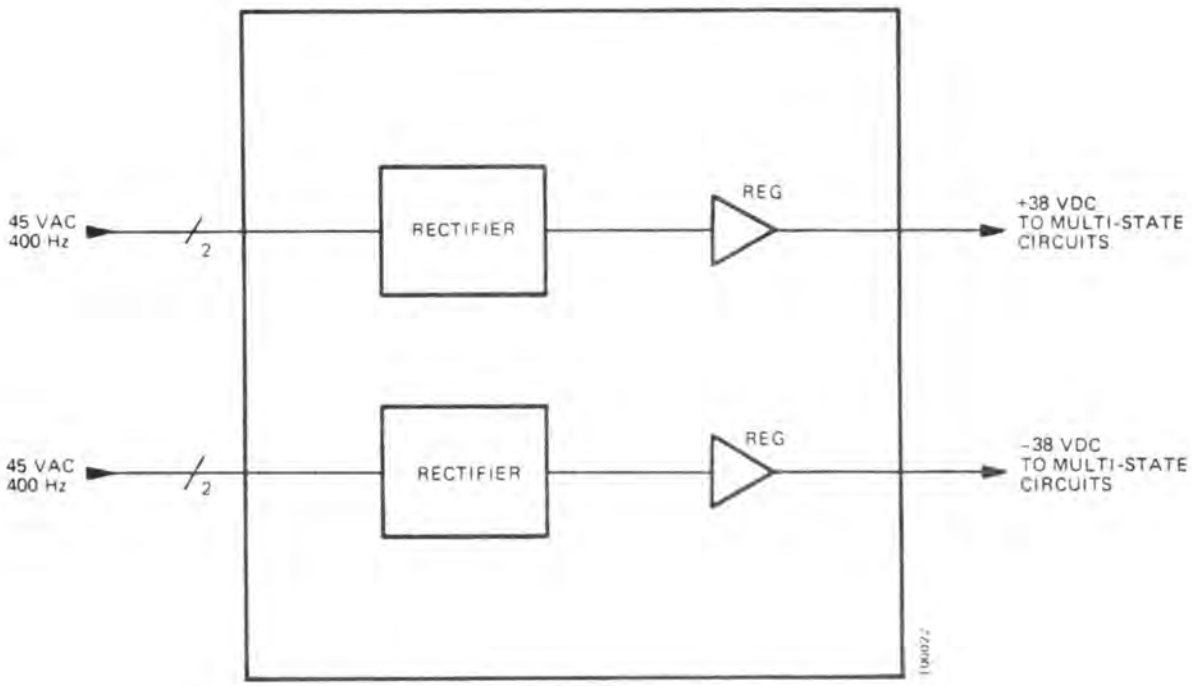
Figure 7



SYNCHRONOUS PRESET

L535 300 505

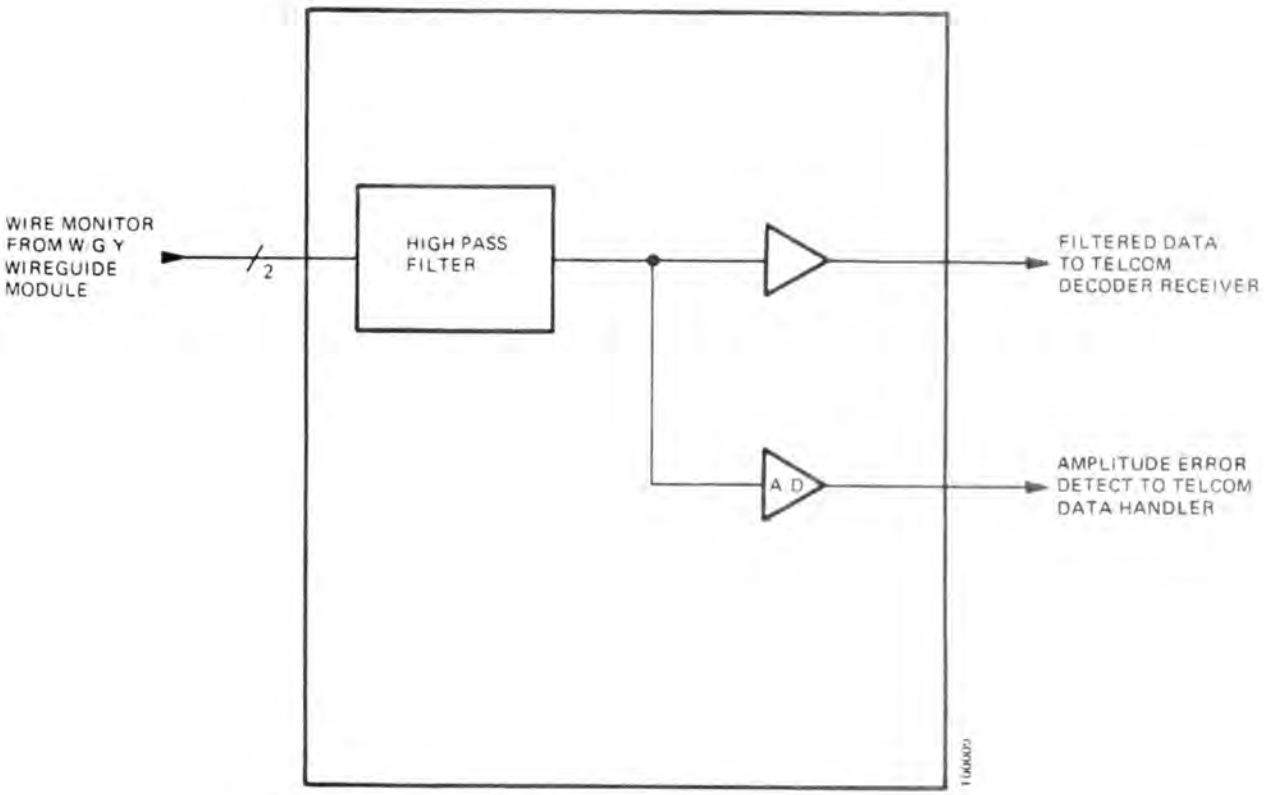
Figure 8



±36 VDC POWER SUPPLY

L535 300 518

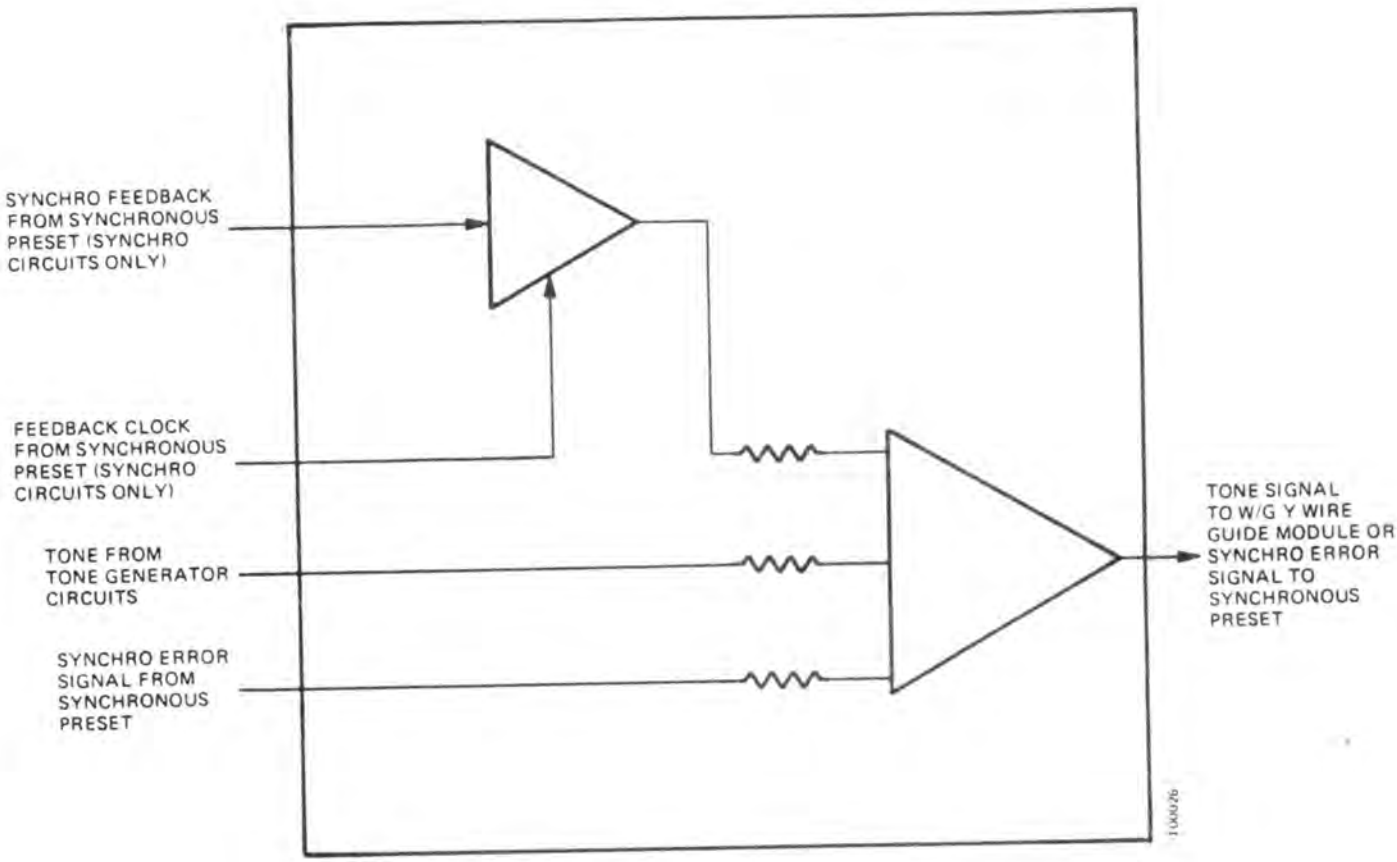
Figure 9



DATA FILTER

L535 300 517

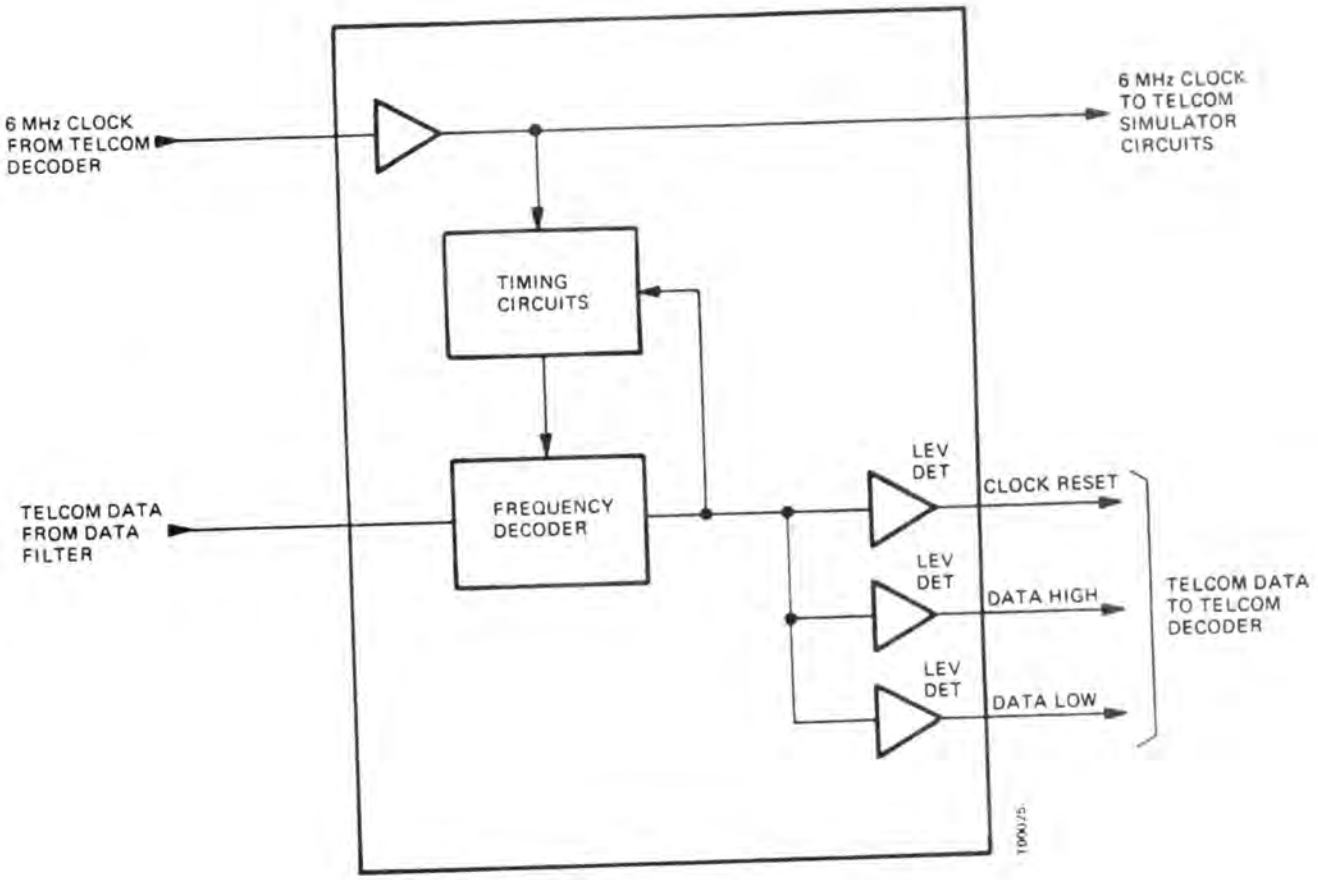
Figure 10


SYNCHRO FEEDBACK FROM SYNCHRONOUS PRESET (SYNCHRO CIRCUITS ONLY)
FEEDBACK CLOCK FROM SYNCHRONOUS PRESET (SYNCHRO CIRCUITS ONLY)
TONE FROM TONE GENERATOR CIRCUITS
SYNCHRO ERROR SIGNAL FROM SYNCHRONOUS PRESET
TONE SIGNAL TO W/G Y WIRE GUIDE MODULE OR SYNCHRO ERROR SIGNAL TO SYNCHRONOUS PRESET
10026

GYRO TONE AMPLIFIER

L535 300 520

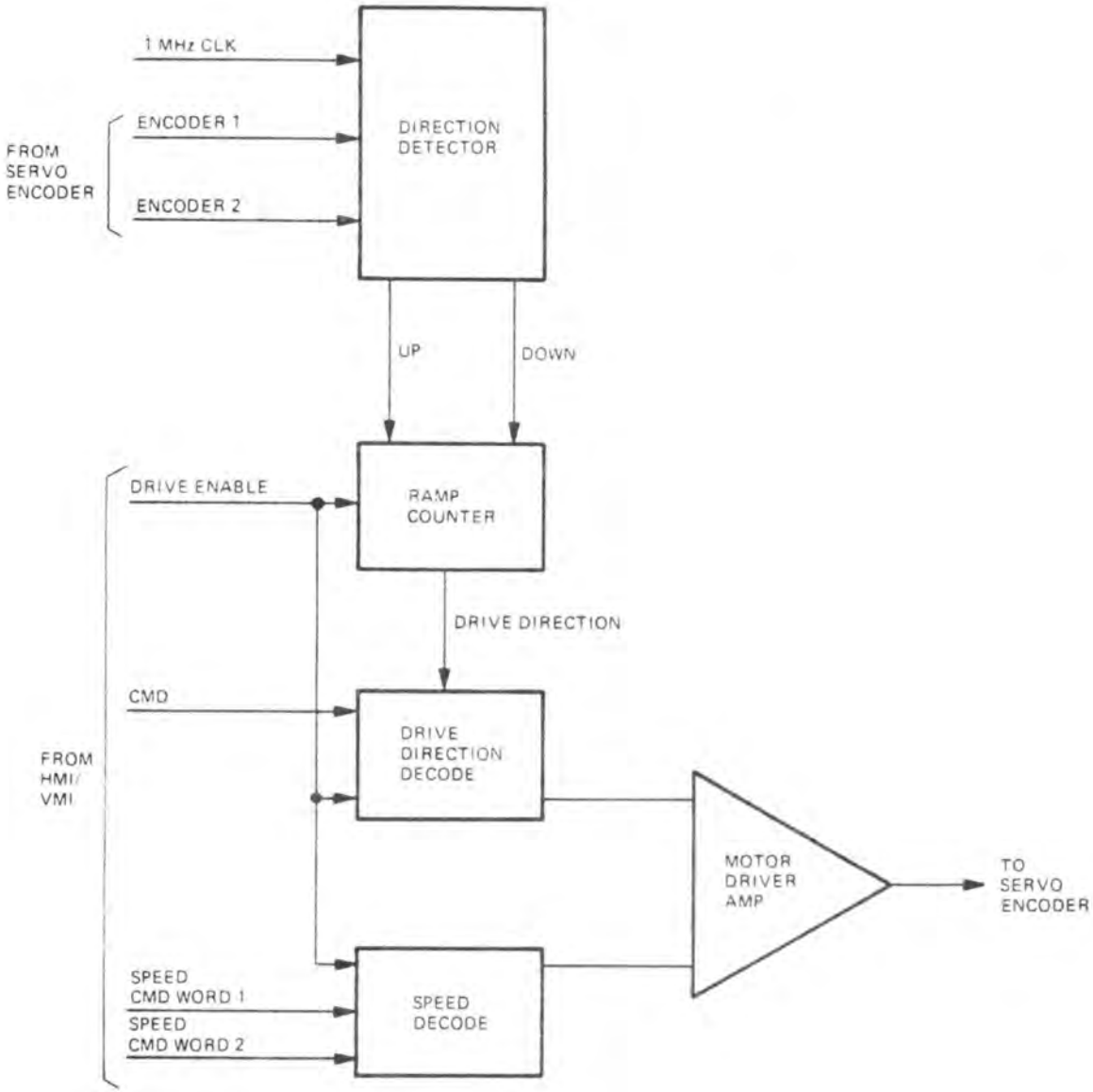
Figure 11



TELCOM DECODER RECEIVER

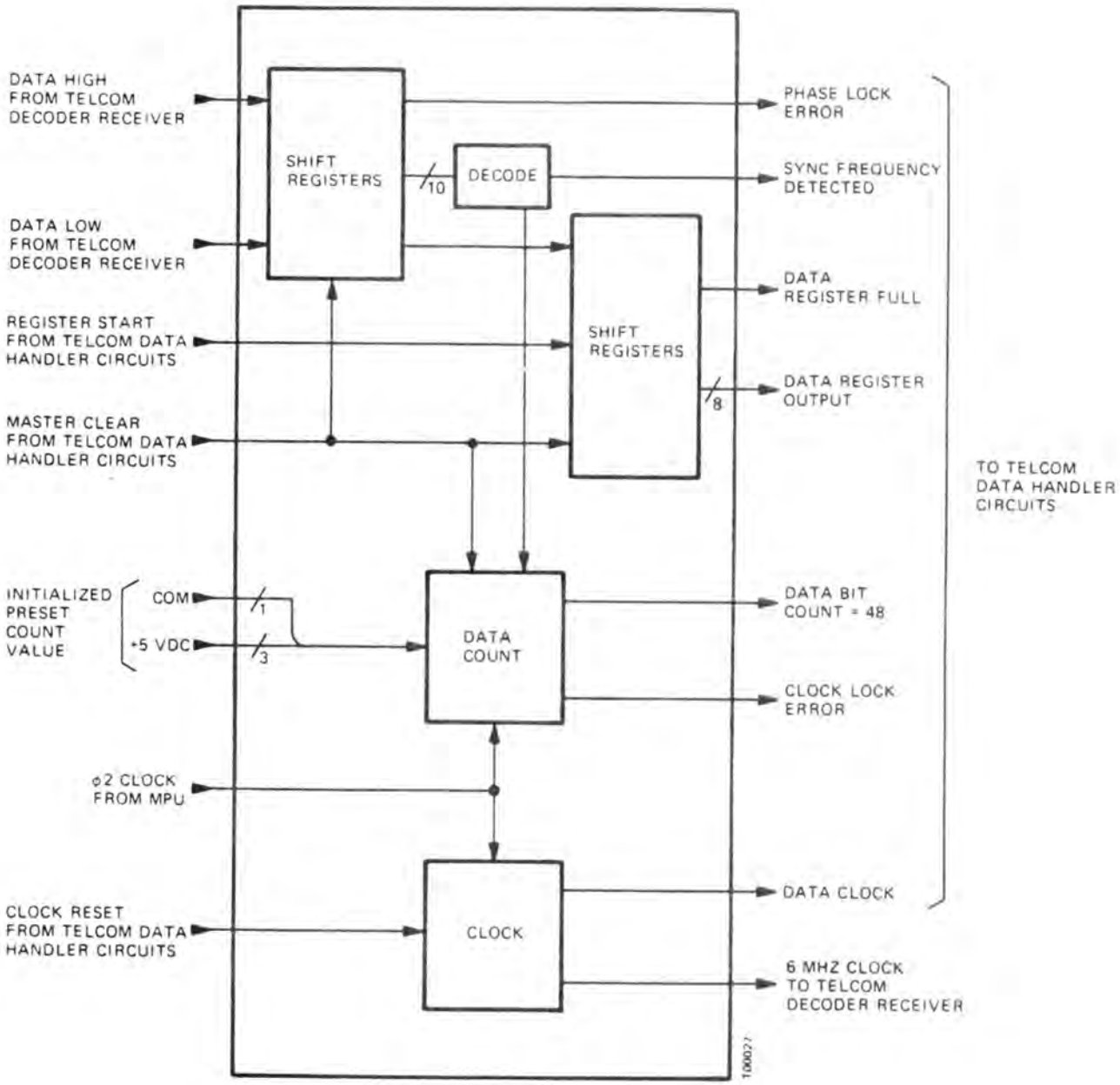
L535 300 519

Figure 12



MOTOR DRIVER

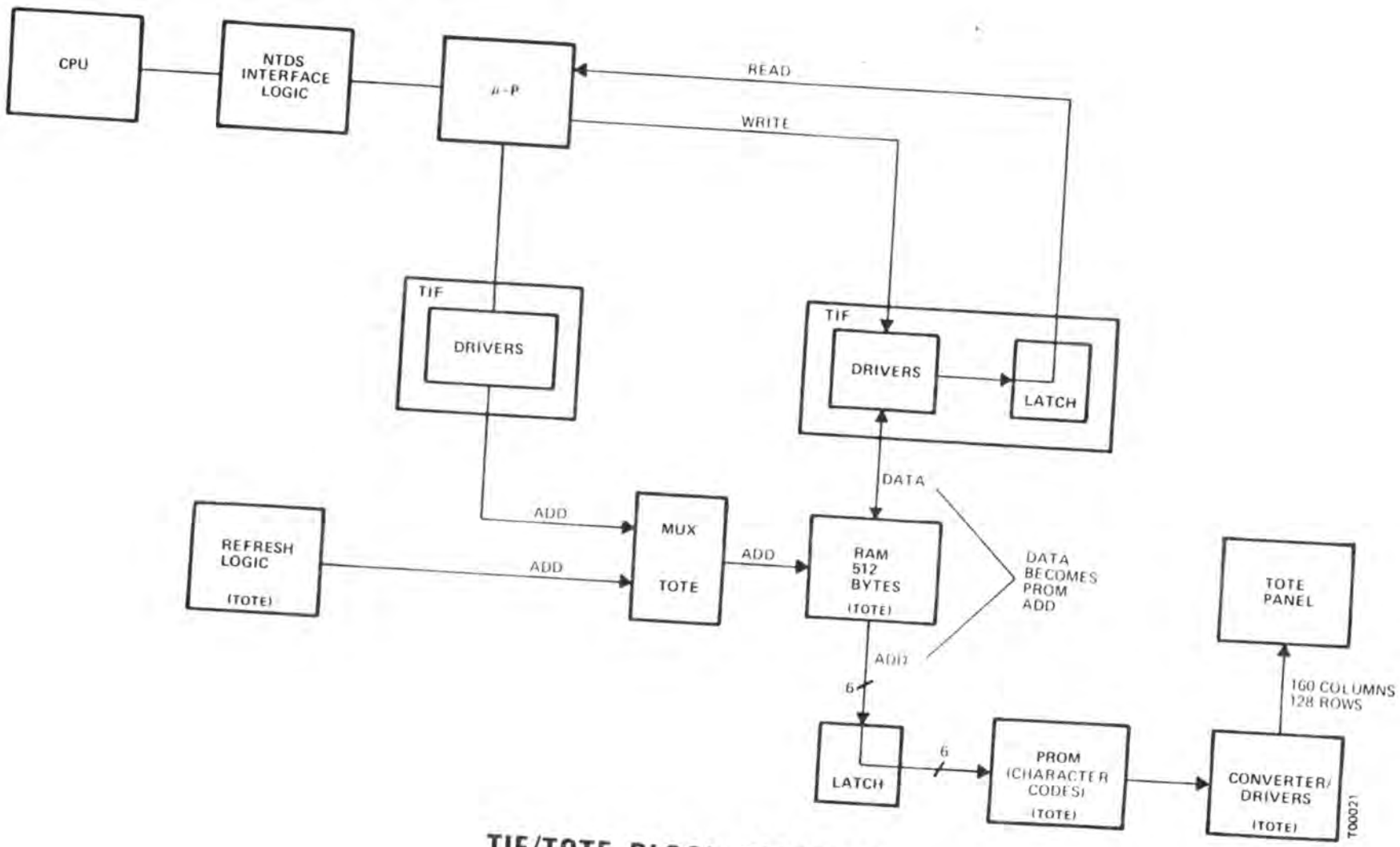
Figure 13



TELCOM DECODER

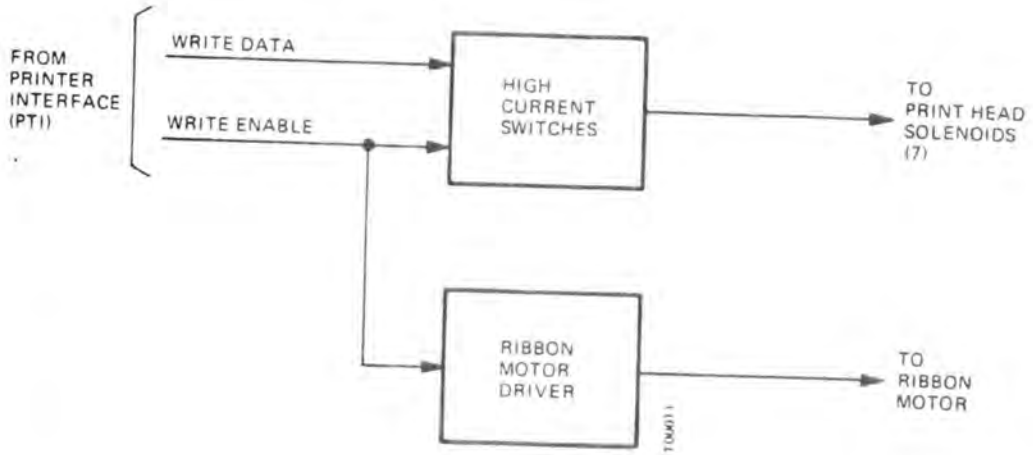
L535 300 522

Figure 14



TIF/TOTE BLOCK DIAGRAM

Figure 15



HAMMER DRIVER

Figure 16

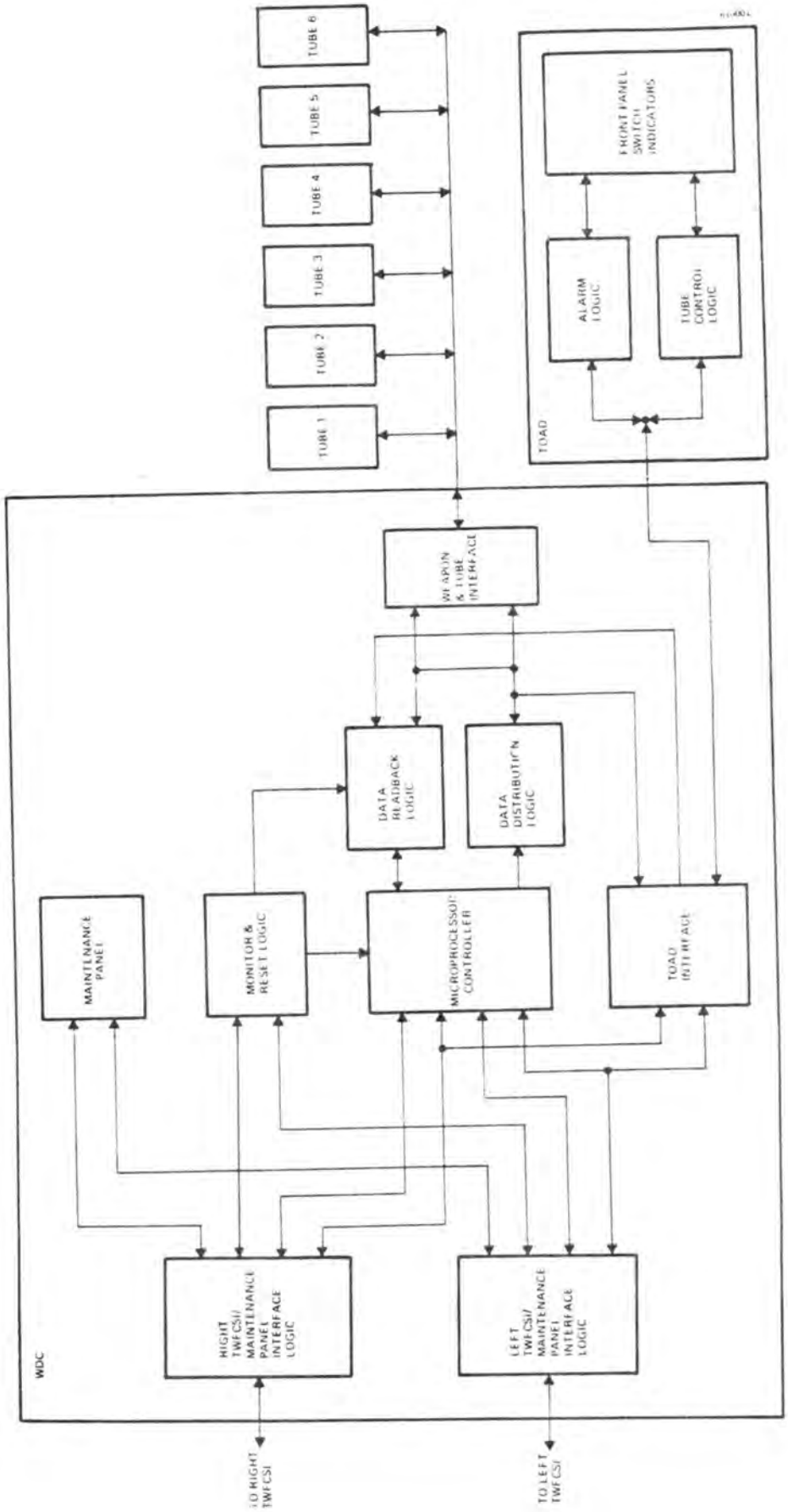
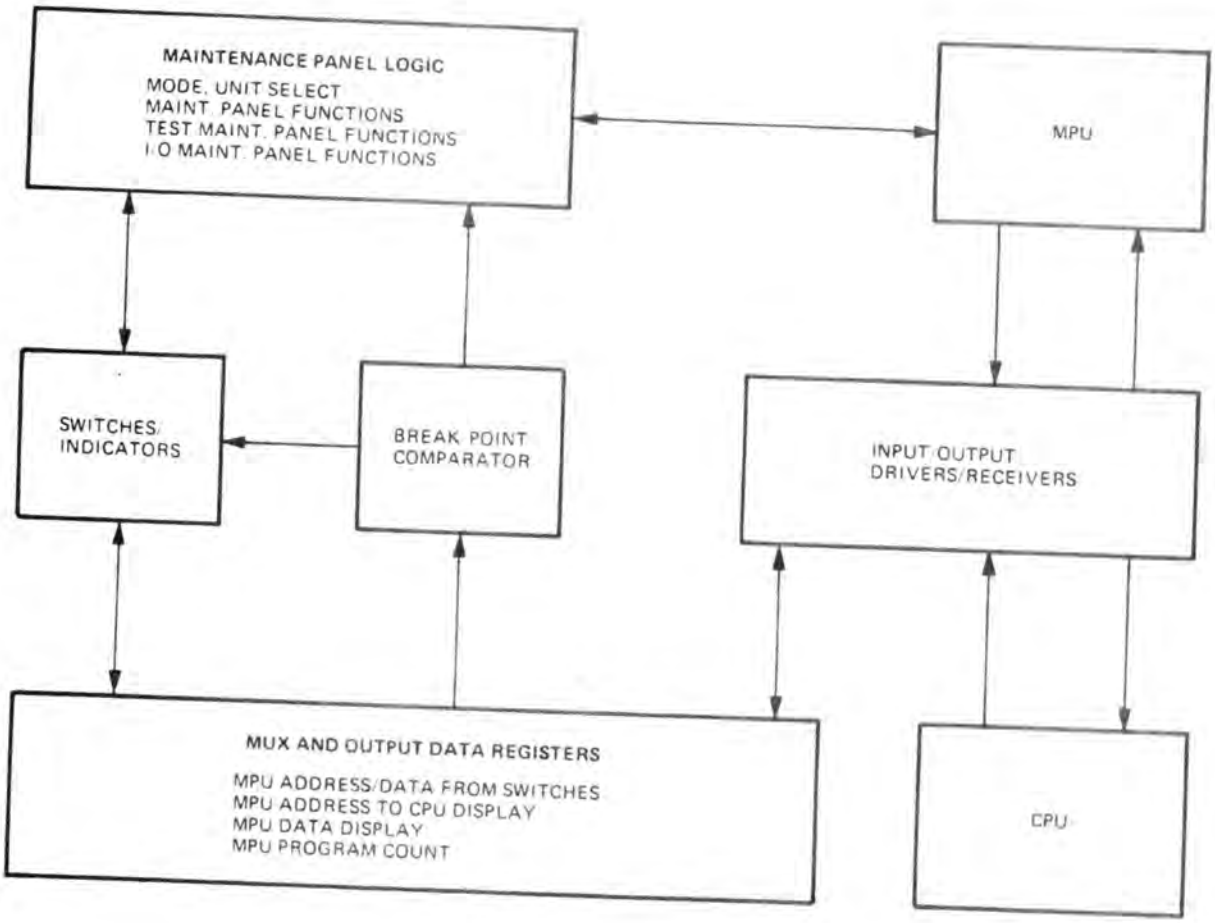
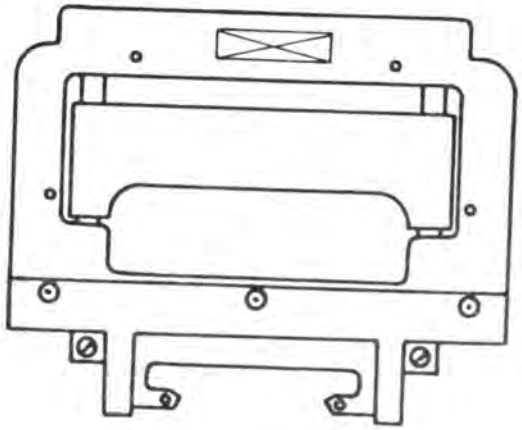

WDC BLOCK DIAGRAM
TUBE 6
TUBE 5
TUBE 4
TUBE 3
TUBE 2
TUBE 1
TOAD
FRONT PANEL SWITCH INDICATORS
ALARM LOGIC
TUBE CONTROL LOGIC
WEAPON & TUBE INTERFACE
DATA READBACK LOGIC
DATA DISTRIBUTION LOGIC
MAINTENANCE PANEL
MONITOR & RESET LOGIC
MICROPROCESSOR CONTROLLER
TOAD INTERFACE
WDC
RIGHT TWFCSI/ MAINTENANCE PANEL INTERFACE LOGIC
LEFT TWFCSI/ MAINTENANCE PANEL INTERFACE LOGIC
TO RIGHT TWFCSI
TO LEFT TWFCSI

Figure 17

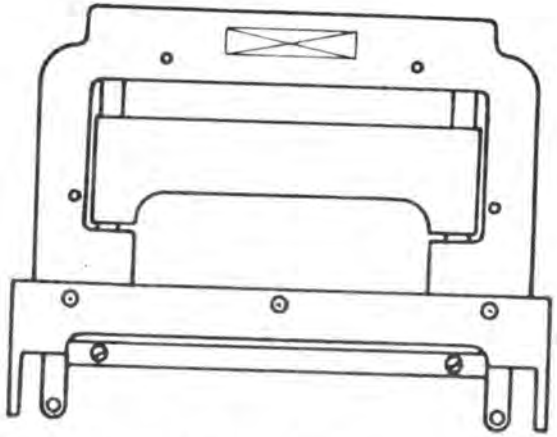


MAINTENANCE PANEL BLOCK DIAGRAM

Figure 18

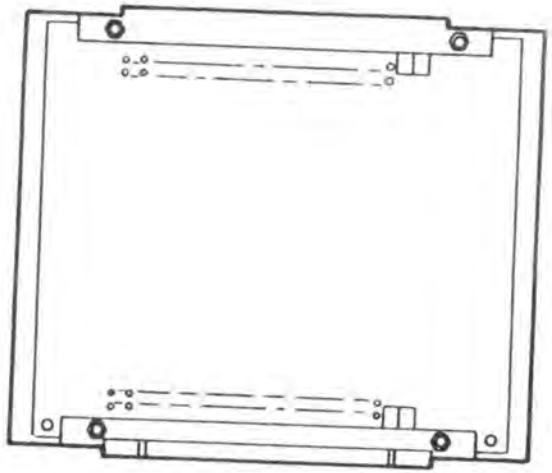


CARD EXTRACTOR
L219 000 003



CARD EXTRACTOR
L219 000 001

NOTE: IN ADDITION TO ITEMS SHOWN, SEE FIGURE 1-2.12 FOR MISCELLANEOUS EQUIPMENT.



EXTENDER CARD
L535 200 554

Figure 19

SFCS MK 1 SOFTWARE FUNCTIONS

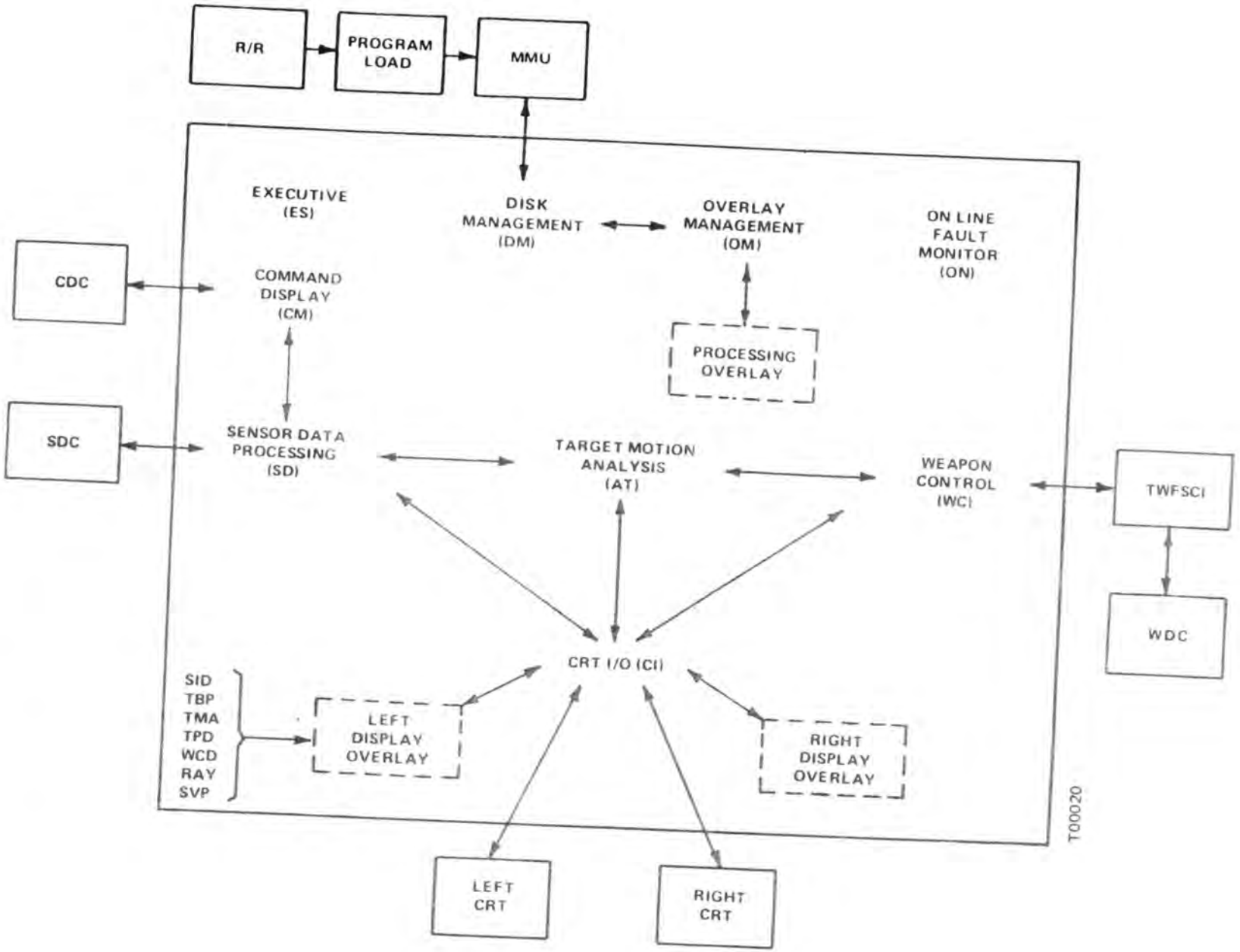
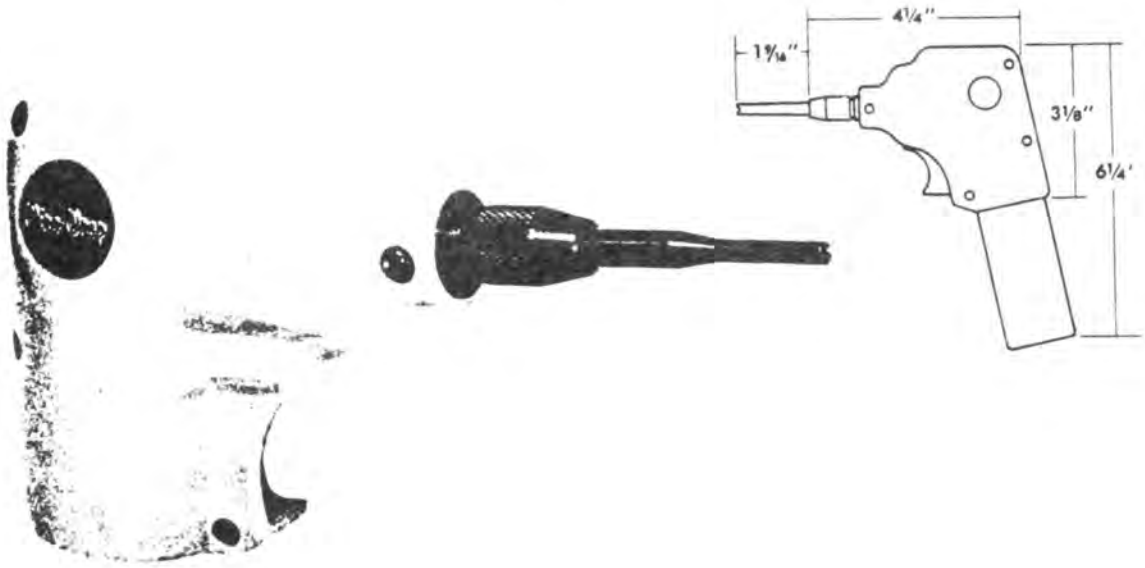


Figure 20



Model No.	Type	Handle	*Wire Capacity	Approx. Wt. Lb.
14R2	Battery	Pistol	22-32 ga.	1

*NOTES: The above tool designation does not include a wrapping bit and sleeve.

MANUAL AND POWERED TOOLS

Figure 21

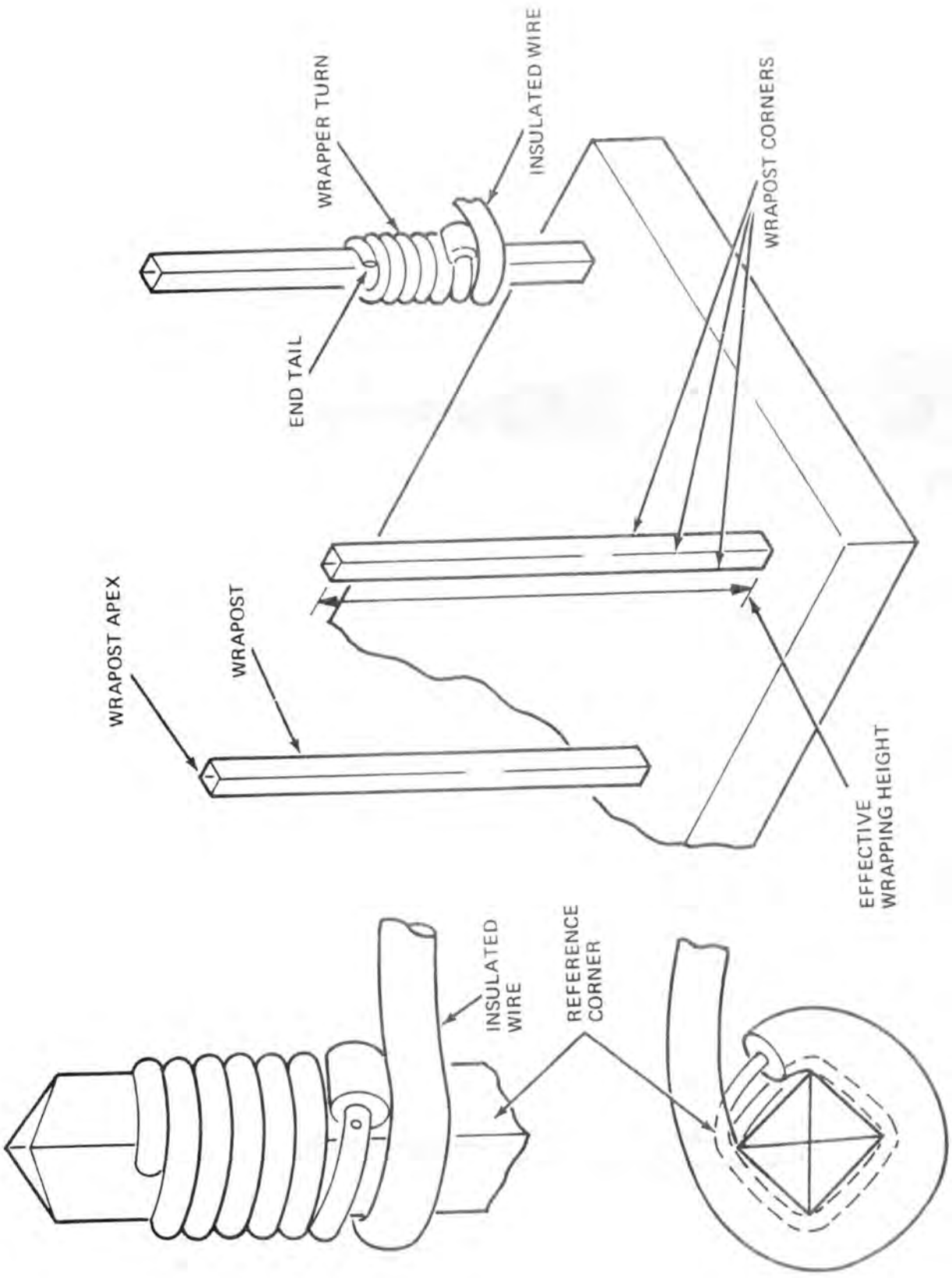

WRAPPER TURN
INSULATED WIRE
WRAPOST CORNERS
END TAIL
WRAPOST APEX
WRAPOST
EFFECTIVE
WRAPPING HEIGHT
INSULATED
WIRE
REFERENCE
CORNER
WRAPOST

Figure 22

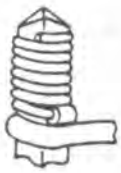
UNACCEPTABLE

EXTENDED END TAIL.

ACCEPTABLE

END TAIL PROPERLY TRIMMED.

INSUFFICIENT INSULATION WRAP.



PROPER INSULATION WRAP.

INSUFFICIENT NUMBER OF TURNS FOR 26 GAUGE WIRE.

CORRECT NUMBER OF TURNS FOR 26 GAUGE WIRE.

T00014

ACCEPTABLE/UNACCEPTABLE WRAPS (1)

Figure 23

UNACCEPTABLE

OVERLAP

ACCEPTABLE

WRAPS ARE NOT OVERLAPPED.
WRAPS ARE UNIFORM.

SPIRAL WRAP.

TURNS ARE NOT SPREAD.

OPEN WRAP.

WRAPS ARE CLOSE TOGETHER.

WRAP EXTENDED
INTO THE APEX.

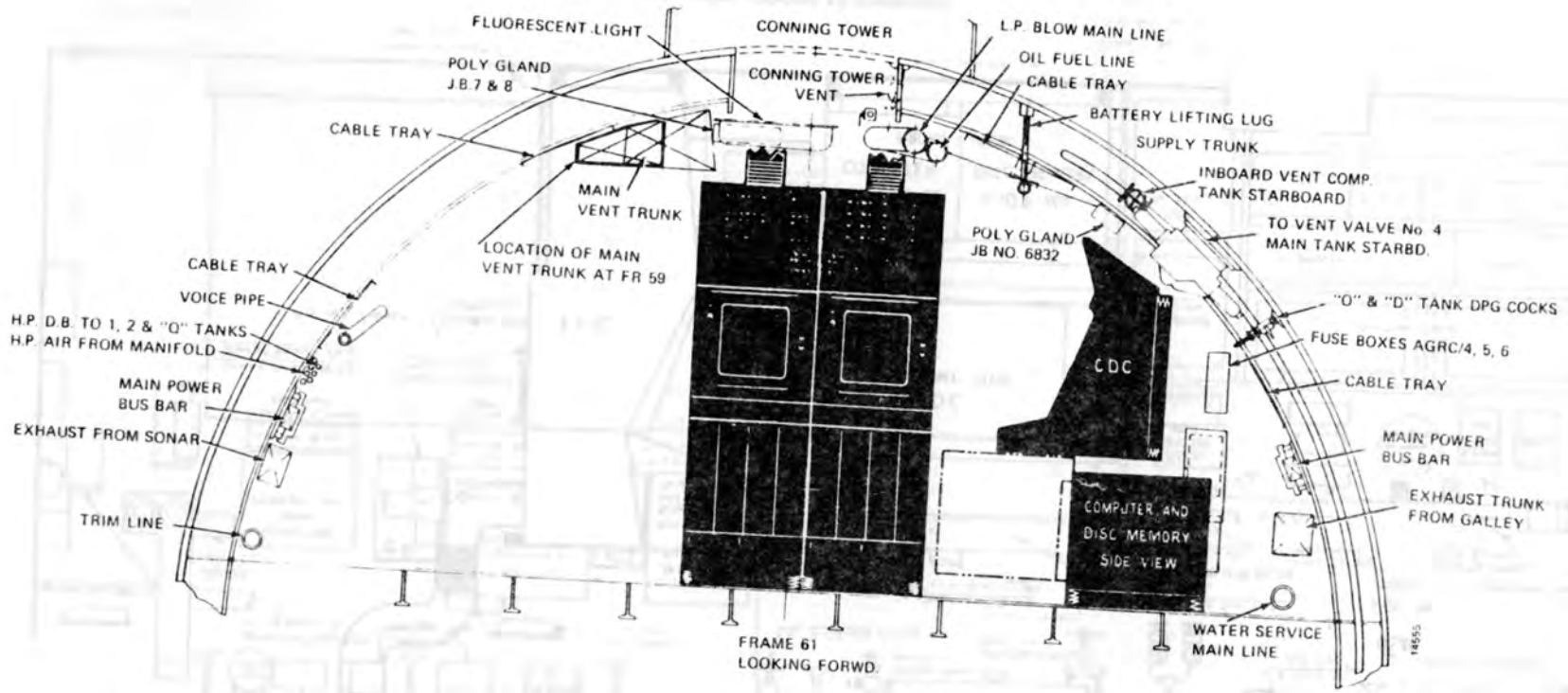
T00015

TOP WRAP BELOW WRAPOST APEX.

ACCEPTABLE/UNACCEPTABLE WRAPS (2)

Figure 24

Figure 25



Control Room Equipment Location (2)

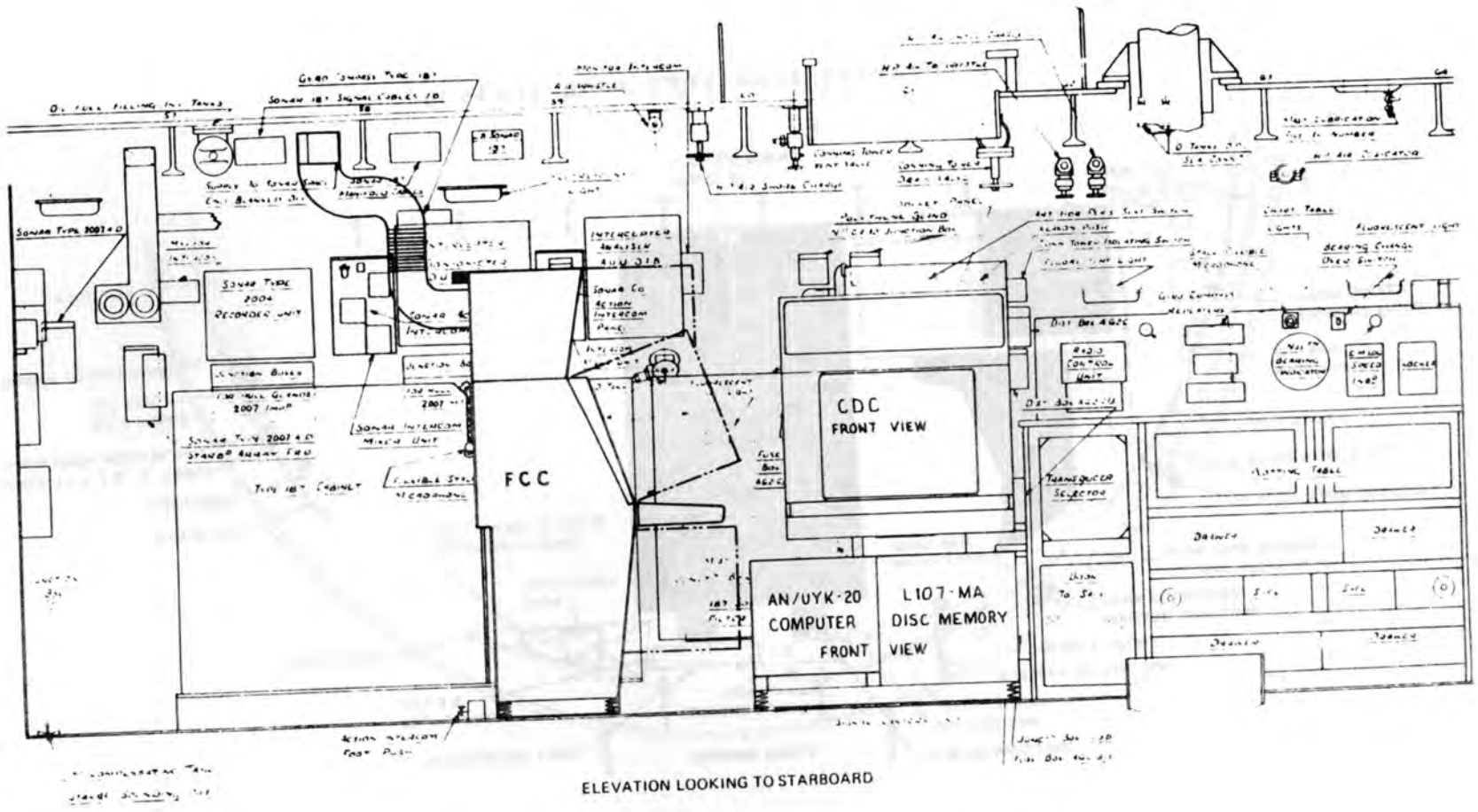
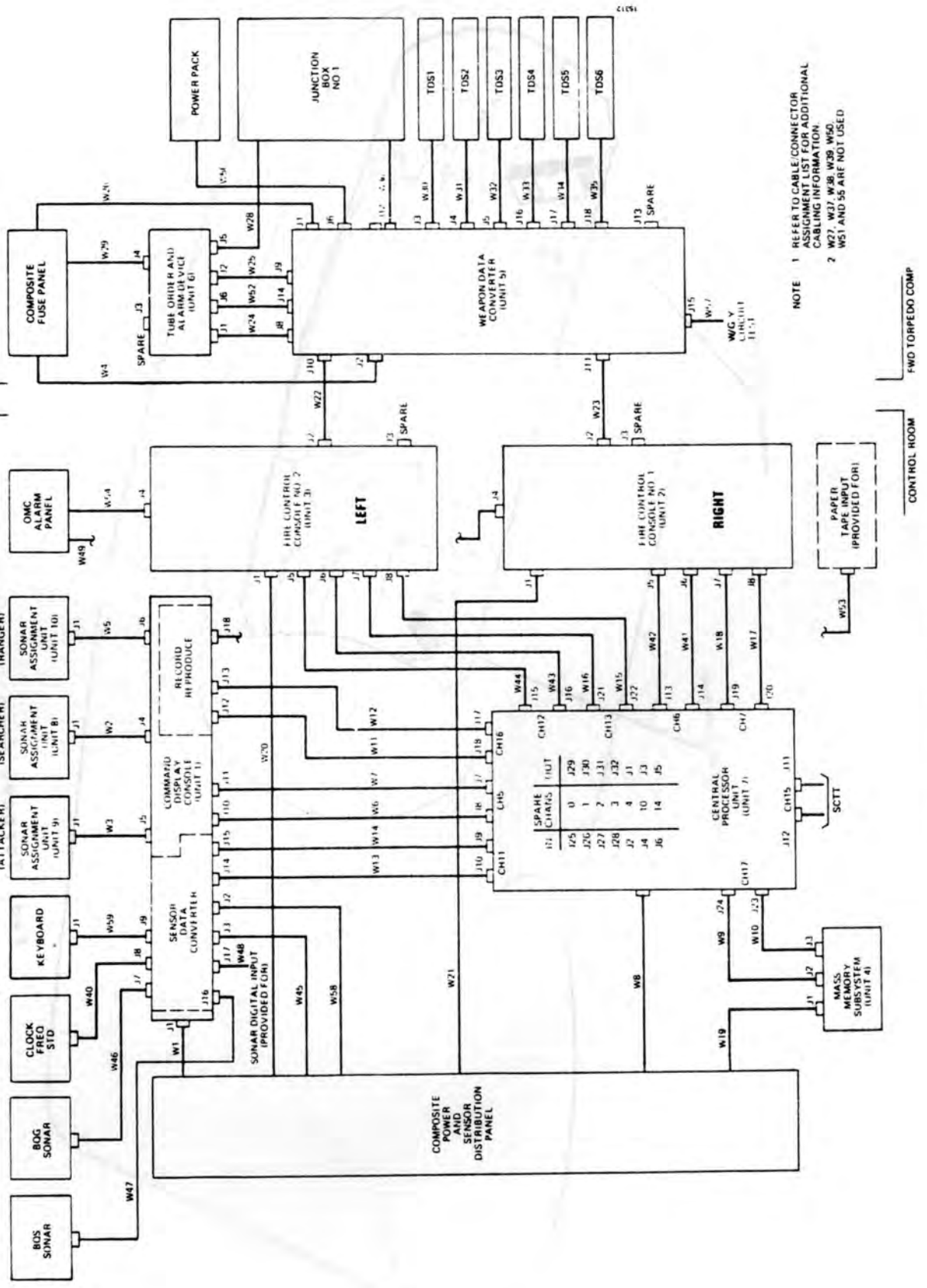


Figure 26

Control Room Equipment Location (1)

Fwd. Torpedo Compartment Equipment Location

Figure 27



System Cabling Block Diagram

Figure 28

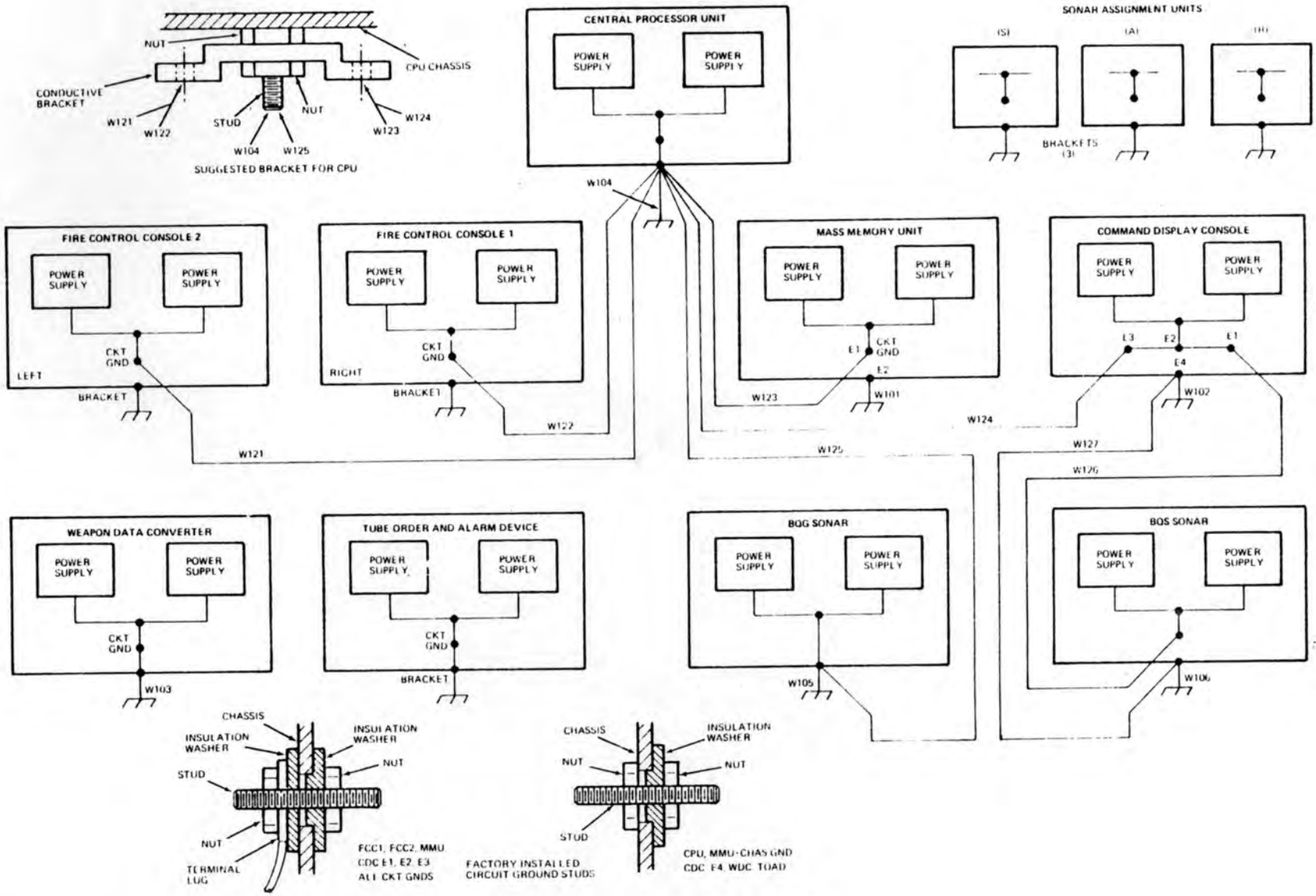


Figure 29 System Earthing Diagram

From: Holbrook Submarine Museum
ID: PB 1380
Location: Holbrook Submarine Museum mezzanine floor in box 35
Scanned: 20221230
Scanned By: Dirk Stoffels
Doc Source: RAN Submarine School - HMAS PLATYPUS
Doc Marking: